	UNIVERSIDAD DE SAN CARLOS DE GUATEMALA	FÍSICA 2 C	NOTA:
	FACULTAD DE INGENIERÍA		
	ESCUELA DE CIENCIAS	1S2023	
	DEPARTAMENTO DE FÍSICA		
	INGA. CLAUDIA CECILIA CONTRERAS FOLGAR DE ALFARO	AUX. ANGEL QUIM	

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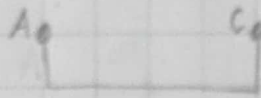
Tarea 3

T3

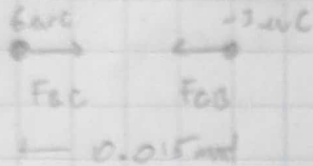
P.1

$$A, B = 6 \mu\text{C}$$

$$C = -12 \mu\text{C}$$



$$Q_{AC} = \frac{6 \mu\text{C} - 12 \mu\text{C}}{2} = -3 \mu\text{C}$$



$$F_{AC} = -F_{CA} = \frac{K (6 \times 10^{-6}) (3 \times 10^{-6})}{(0.015)^2}$$

$$F_{AC} = 720$$

$$F_{AC} = 720 \text{ N}$$

P.2

$$\rho = 800 \text{ nC/m}^3$$

$$R = 24 \text{ cm} = 0.24 \text{ m}$$

$$l = 0.06 \text{ m}$$



$$\rho = \frac{Q}{\frac{4}{3} \pi R^3}$$

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

$$E (6l^2) = \frac{\rho l^3}{\epsilon_0}$$

$$E = \frac{\rho l}{6 \epsilon_0} = \frac{800 \text{ n} (0.06)}{6 (8.85 \times 10^{-12})} = 903.95$$

$$\Phi = 19.53 \text{ Nm}^2/\text{C}$$

$$\Phi = E A = (903.95) [6 (0.06)^2] = 19.525$$

P.3

$$a) q = 30 \times 10^{-3} \text{ C}$$

$$m = 7 \times 10^{-3} \text{ kg}$$

$$E_y = 3.5 \text{ N/C}$$

$$E_x = E_z = 0$$

$$t = 0$$

$$V_{0x} = 50 \text{ m/s}$$

$$V_{0y} = V_{0z} = 0$$

$$a = \frac{Eq}{m} = \frac{(3.5)(30 \times 10^{-3})}{7 \times 10^{-3}} = 15 \text{ m/s}^2$$

$$V_{fy} = V_{0y} + at$$

$$V_{fy} = at = (15)(2)$$

$$V_{fy} = (15)(2) = 30 \text{ m/s}$$

$$v = \sqrt{30^2 + 50^2} = 58.31 \text{ m/s}$$

$$v = 58.3 \text{ m/s}$$

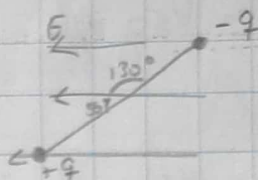
$$b) y = V_{0y} t + \frac{1}{2} a t^2 =$$

$$y = \frac{1}{2} (15) (2)^2 = 30 \text{ m}$$

$$y = 30 \text{ m}$$

P. 4

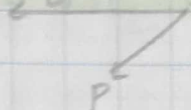
a) $q = 2.5 \times 10^{-3} \text{ C}$
 $l = 0.06 \text{ m}$
 $E = 6 \times 10^5 \text{ N/C}$



$\tau = PE \sin 50^\circ$
 $\tau = q l E \sin 50^\circ$

$\tau = (2.5 \times 10^{-3})(0.06)(6 \times 10^5) \sin 50^\circ = 68.94 \text{ Nm}$

b)



$\tau = -K$

$\tau = 68.94 \text{ N}\cdot\text{m}$

$\tau = -K$

c)

$\Delta W = -\Delta U$

$\Delta W = -PE [\cos \theta_f - \cos \theta_0]$

$\Delta W = -PE [\cos 50^\circ - \cos 150^\circ] = (2.5 \times 10^{-3})(0.06)(6 \times 10^5) \cos 150^\circ$

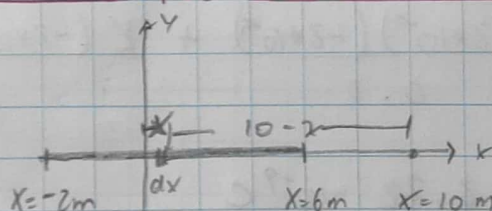
$\Delta W = -32.15 \text{ J}$

$W = -32.15 \text{ J}$

P. 5

$q = 24 \text{ nC}$

a) $E = \int \frac{k dq}{r^2}$



$\lambda = q/l$

$q = \lambda l$

$dq = \lambda dx$

$E = k \lambda \int_{-2}^6 \frac{dx}{(10-x)^2} = k \lambda \int_{-2}^6 \frac{dx}{(10-x)^2} = k \lambda \left[\frac{1}{10-x} \right]_{-2}^6$

$E = 9 \times 10^9 \left(\frac{24 \text{ n}}{8} \right) \left[\frac{1}{4} - \frac{1}{12} \right] = 4.5 \text{ N/C}$

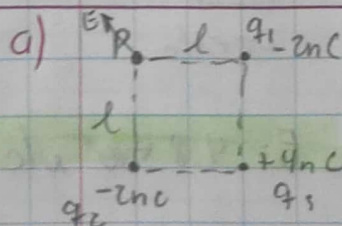
$E = 4.5 \text{ N/C}$

b)

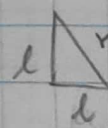
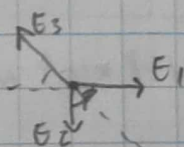
$E \rightarrow (+x)$

$E = +x$

P. 6



$l = 0.2 \text{ m}$



$r^2 = l^2 + l^2 = 2l^2$

$r = 0.2\sqrt{2}$

$r = \sqrt{2}/5$

$E_1 = \frac{k(2 \times 10^{-9})}{(0.2)^2} = 450 \text{ N/C}$

$$E_1 = \frac{k(2 \times 10^{-9})}{(0.2)^2} = 450 \text{ N/C}$$

$$|E_R| = \sqrt{(937.8)^2 + (-137.8)^2}$$

$$E_3 = \frac{k(4 \times 10^{-9})}{2(0.2)^2} = 450 \text{ N/C}$$

$$|E_R| = 186.39$$

$$E_R = 137.8 \hat{x} - 137.8 \hat{y}$$

$$E = 186.39 \text{ N/C}$$

$$b) V = \frac{kq_1}{r_1} + \frac{kq_2}{r_2} + \frac{kq_3}{r_3}$$

$$V = \frac{k}{0.2} \left(-2(2 \times 10^{-9}) + \frac{4 \times 10^{-9}}{\sqrt{2}} \right) = -52.72 \text{ V}$$

$$V = -52.72 \text{ V}$$

$$c) U = \frac{kq_1q_2}{r} + \frac{kq_1q_3}{r} + \frac{kq_2q_3}{r}$$

$$U = \frac{k(-2 \times 10^{-9})(-2 \times 10^{-9})}{0.2} + \frac{k(-2 \times 10^{-9})(4 \times 10^{-9})}{0.2} + \frac{k(-2 \times 10^{-9})(4 \times 10^{-9})}{0.2}$$

$$U = -592.72 \times 10^{-9} \text{ J}$$

$$U = -592.72 \text{ nJ}$$

$$d) W = (V_f - V_0)q \Rightarrow W = \left[\left(\frac{-kq}{a_1} - \frac{kq}{a} \right) - \left(\frac{-kq}{a} - \frac{kq}{a} \right) \right] q = 0$$

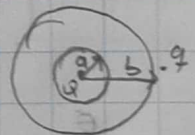
$$W = 0$$

P.7

$$a) a = 0.05 \text{ m} \quad b = 0.15 \text{ m} \quad l = 0.3 \text{ m}$$

$$Q = +9 \text{ nC} \quad q = -25 \text{ nC}$$

$$E = r = 0.2 \text{ m}$$



$$\oint E dA = \frac{q_{en}}{\epsilon_0} \Rightarrow E(2\pi r l) = \frac{Q - q}{\epsilon_0} \Rightarrow E = \frac{Q - q}{2\pi r l \epsilon_0}$$

$$E = \frac{(9 \text{ nC} - 25 \text{ nC})}{2\pi(0.2)(0.3)\epsilon_0} = 4.8 \times 10^6 \text{ N/C}$$

$$E = 4.8 \times 10^6 \text{ N/C}$$

b) $E = r = 7 \text{ cm}$

$$\oint E \cdot dA = \frac{q_{\text{enc}}}{\epsilon_0}$$

$$E (2\pi r l) = \frac{Q}{\epsilon_0}$$

$$E = \frac{Q}{2\pi r l \epsilon_0} = \frac{9 \times 10^{-6}}{(0.07)(0.3) 2\pi \epsilon_0} = 7.71 \frac{\text{KN}}{\text{C}}$$

$$E = 7.71 \text{ KN/C}$$

c) $E = r < 3 \text{ cm}$

$$\oint E \cdot dA = \frac{q_{\text{enc}}}{\epsilon_0}$$

$$\Rightarrow E = \frac{q_{\text{enc}}}{2\pi r l \epsilon_0}$$

$$Q_{\text{enc}} = q_{\text{enc}}$$

$$\frac{Q}{V_T} = \frac{q_{\text{enc}}}{V_{\text{enc}}}$$

$$E = \frac{3.24 \mu}{2\pi (0.03)(0.3) \epsilon_0} = 6.48 \text{ KN/C}$$

$$q_{\text{enc}} = \frac{Q V_{\text{enc}}}{V_T}$$

$$q_{\text{enc}} = 3.24 \times 10^{-6} \text{ C}$$

$$E = 6.48 \text{ KN/C}$$