UNIVERSIDAD DE SAN CARLOS
FACULTAD DE INGENIERIA
DEPARTAMENTO DE FISICIA
CURSO DE VACACIONES DICIEMBRE 2022

Firma:

Carné: 201709088 Curso: Física 2 Sección: B

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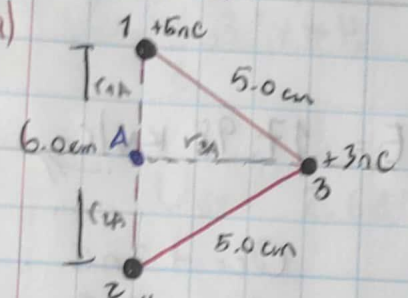
Puede iniciar su examen a partir de aquí

Problema 1:

a)



$V_A = V_{1A} + V_{2A} + V_{3A}$

$r_{1A} = r_{2A} = 0.03\ m$

$r_{3A} = \sqrt{0.05^2 + 0.03^2} = 0.05831\ m.$

$V_A = \frac{Kq_1}{r_{1A}} + \frac{Kq_2}{r_{2A}} + \frac{Kq_3}{r_{3A}}$

$V_A = K\left(\frac{5n}{0.03} - \frac{4n}{0.03} + \frac{3n}{0.05831}\right) = 763.04\ V.$

$V_A = 763.04\ V.$ —1

b) $W = -\Delta U \qquad U = qV$

$W = U_o - U_f$

$W = q_3 V_{3A} - q_3 V_A$

$W = q_3 (V_{3A} - V_A)$

$W = 3n\left(\frac{Kq_3}{r_{3A}} - 763.04\right)$

$W = 3n\left(\frac{K3n}{0.05837} - 763.04\right) = -8.9999 \times 10^{-7} = -9.0 \times 10^{-7}$

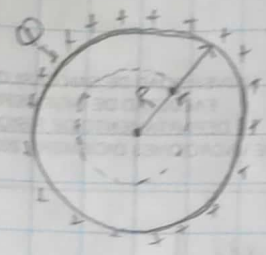
$W = -9.0 \times 10^{-7}\ J$ —4

c) $U_{sist} = \frac{Kq_1q_2}{r_{12}} + \frac{Kq_1q_3}{r_{13}} + \frac{Kq_2q_3}{r_{23}}$

$U_{sist} = K\left(\frac{(5n)(-4n)}{0.06} + \frac{(5n)(3n)}{0.05} + \frac{(-4n)(3n)}{0.05}\right) = -7.46 \times 10^{-6}$

$U_{sist} = -7.46 \times 10^{-6}\ J$ —4

Problema 2.



$Q = 5\,nC$

$R = 0.1\,m$

$r = R/2 = 0.05$

$$\oint \vec{E}\, d\vec{A} = \frac{q_{enc}}{\varepsilon_0}$$

$q_{enc} = \rho V$

a)

$$E_{Gaussiana} = \frac{q_{enc}}{\varepsilon_0}$$

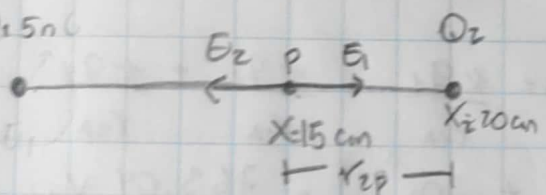
$$\rho = \frac{Q}{V}$$

$$E = \frac{q_{enc}}{4\pi r^2 \varepsilon_0} = \frac{\rho \cancel{\tfrac{4}{3}\pi r^3}}{\cancel{4\pi r^2}\,\varepsilon_0} = \frac{\rho r}{3\varepsilon_0}$$

$$E = \frac{\left(\frac{5n}{\frac{4}{3}\pi r^3}\right) r}{3\varepsilon_0} = \frac{\frac{5n}{\cancel{4/3}\pi r^2}}{\cancel{3}\varepsilon_0} = \frac{5n}{4\pi r^2 \varepsilon_0} = 17975.08\ N/C$$

$E = 17.98\ kN/C$

b)



$Q_2 = +2\,nC$

$x_2 = 0.2\,m$

$E_1 = 17975.08$

$E_R = E_1 + E_2$

$$E_2 = \frac{K|q_2|}{r_{2p}} = \frac{K|2n|}{0.05} = 360\ N/C$$

$E_R = 17975.08 + 360$

$E_R = 18\,335.08$

$E_R = 18.3\ kN/C$

Problema 4.

a) $V = 480\,V$ $I_1 = 5\,A$ $P_1 = I_1 V$

$T = 20\,h/día$ $I_2 = 2.5\,A$ $P_1 = (5)(480) = 2400\ W$

$T = 7200\,s/día$

$P_2 = (7.5)(480) = 1200\ W$

$E_2 = (1.2\,kw)(20h) = 24\,kw/h * 30 = 720\,kw/h$

$E_1 = (2.4\,kw)(20h) = 48\,kw/h * 30 = 1440\,kw/h$

$E_{consumida} = 2160\,kw/h$

Problema 5:

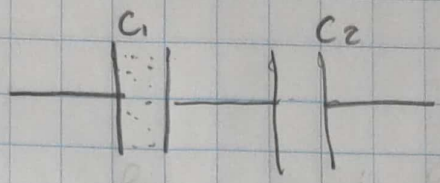
$K = 2.5$

$d = 2 \times 10^{-4}\ m$

$A = 54.23\ m^2$

$C_2 = 3\ \mu F$

$V = 8.00\ V$



$$C_1 = (K)\frac{\varepsilon_0 A}{d} = \frac{K\varepsilon_0 (54.23)}{2 \times 10^{-4}}$$

$$C_1 = K(2.40 \times 10^{-6}) = 6 \times 10^{-6}$$

$C_2 = 2.40 \times 10^{-6}$

$$U_1 = \frac{1}{2} C_1 V^2 = \frac{1}{2}(6 \times 10^{-6})(8)^2 = 1.92 \times 10^{-4}\ J.$$

$$U_2 = \frac{1}{2} C_2 V^2 = \frac{1}{2}(2.40 \times 10^{-6})(8)^2 = 7.68 \times 10^{-5}\ J$$

$$U_{ET} = 2.688 \times 10^{-4} = 268 \times 10^{-6}\ J$$

$$U_{ET} = 268 \times 10^{-6}\ J$$ //