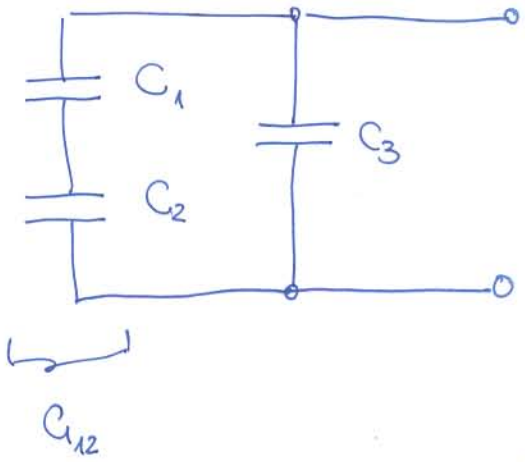
FIS 1532 Pauta I2

Problema 1:

1)



$$C_1 = \varepsilon_0 \varepsilon_{r,1} \frac{a/2 \cdot b}{d/2}$$

$$C_2 = \varepsilon_0 \varepsilon_{r,2} \frac{a/2 \cdot b}{d/2}$$

$$C_3 = \varepsilon_0 \cdot 1 \frac{a/2 \cdot b}{d}$$

↑ aire

1 pt

$$C_{1,2} = \frac{C_1 C_2}{C_1 + C_2}$$ 1pt

$$C_{eq} = C_3 + C_{1,2} = \varepsilon_0 \frac{ab}{2d} + \frac{\varepsilon_0 \varepsilon_{r,1} \frac{ab}{d} \cdot \varepsilon_0 \varepsilon_{r,2} \frac{ab}{d}}{\varepsilon_0 (\varepsilon_{r,1} + \varepsilon_{r,2}) \frac{ab}{d}}$$ 1pt

$$= \varepsilon_0 \frac{ab}{d} \left(\frac{1}{2} + \frac{\varepsilon_{r,1} \varepsilon_{r,2}}{\varepsilon_{r,1} + \varepsilon_{r,2}} \right)$$ ← 1pt

2) Valor numérico:

$$C_{eq} = 9 \cdot 10^{-12} \frac{F}{m} \cdot \frac{4 \cdot 10^{-4} m^2}{4 \cdot 10^{-3} m} \left(\frac{1}{2} + \frac{6 \cdot 3}{6+3} \right)$$

$\frac{6+3}{9} = \frac{18}{9} = 2$

$$= 9 \cdot 10^{-13} F \cdot 2{,}5$$

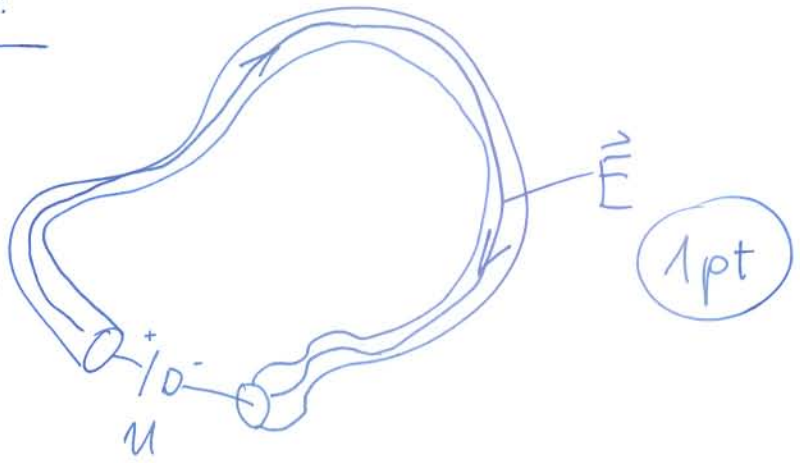
$$= 2{,}25 \cdot 10^{-12} F = 2{,}25 \text{ pF}$$

1pt 1pt

Problema 2:

1) $$E = \frac{U}{\ell} = \frac{6\,V}{2m} = 3\,\frac{V}{m}$$ (1pt)

dirección:



(1pt)

2) $$j = \sigma E \quad ; \quad E = \frac{U}{\ell} \; ; \; \sigma = \frac{1}{\rho}$$

$$j = q n v_d$$

$$\Rightarrow \quad q n v_d = \frac{1}{\rho}\frac{U}{\ell}$$

$$v_d = \frac{U}{\rho \ell q n}$$ ← hasta aquí (3pts)

Valor numérico:

$$V_d = \frac{3 \cancel{V}}{10^{-8}\,\cancel{\Omega m} \cdot \cancel{m} \cdot 10^{-19}\,C \cdot 10^{29}\,\frac{1}{m^3}}$$

$$= 3 \cdot 10^{8+19-29}\ \frac{V m}{\Omega C}$$

$$= \underbrace{3 \cdot 10^{-2}}_{0,5\,pt}\ \underbrace{\frac{m}{s}}_{0,5\,pt} = 3\ \frac{cm}{s}$$

Pregunta: C