

24.7, p. 127

$$C = 1,0 \text{ pF} = 1,0 \cdot 10^{-12} \text{ F}$$



$$C = \frac{q}{\Delta V} = \frac{\epsilon_0 A}{d}$$

$$d = \frac{\epsilon_0 A}{C}$$

$$R \cong 1,0 \text{ cm} = 1,0 \cdot 10^{-2} \text{ m}$$

$$A = \pi \cdot R^2 = \pi (1,0 \cdot 10^{-2})^2 \\ = 3,1 \cdot 10^{-4} \text{ m}^2$$

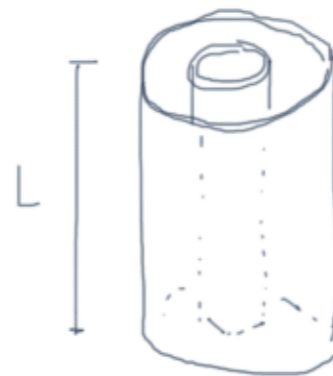
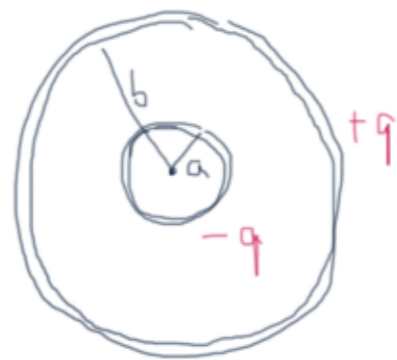
$$d = \frac{8,85 \cdot 10^{-12} \cdot 3,1 \cdot 10^{-4}}{1,0 \cdot 10^{-12}}$$

$$d = 27 \cdot 10^{-4} \text{ m}$$

ou

$$d = 2,7 \text{ mm}$$

24.9, p. 127



$$q = 10,0 \text{ pC} = 10,0 \cdot 10^{-12} \text{ C}$$

$$a = 0,5 \text{ mm} = 0,5 \cdot 10^{-3} \text{ m}$$

$$b = 5,0 \text{ mm} = 5,0 \cdot 10^{-3} \text{ m}$$

$$L = 18,0 \text{ cm} = 18,0 \cdot 10^{-2} \text{ m}$$

a)

$$C = \frac{2\pi\epsilon_0 L}{\ln\left(\frac{b}{a}\right)}$$

$$C = \frac{2\pi \cdot 8,85 \cdot 10^{-12} \cdot 18,0 \cdot 10^{-2}}{\ln\left(\frac{5,0 \cdot 10^{-3}}{0,5 \cdot 10^{-3}}\right)}$$

$$C = 44 \cdot 10^{-13} \text{ F} \text{ ou}$$

$$C = 4,4 \text{ pF}$$

b)
$$C = \frac{q}{\Delta V}$$

$$\Delta V = \frac{q}{C}$$

$$\Delta V = \frac{10,0 \cdot 10^{-12}}{4,4 \cdot 10^{-12}}$$

$$\Delta V = 2,3 \text{ V}$$

24.12, p. 127



$$a = 15,0 \text{ cm} = 15,0 \cdot 10^{-2} \text{ m}$$

$$C = 116 \text{ pF} = 116 \cdot 10^{-12} \text{ F}$$

a) $b = ?$

$$C = 4\pi\epsilon_0 \cdot \frac{ab}{b-a}$$

$$(b-a)C = 4\pi\epsilon_0 ab$$

$$bC - aC = 4\pi\epsilon_0 ab$$

$$bC - 4\pi\epsilon_0 ab = aC$$

$$b(C - 4\pi\epsilon_0 a) = aC \rightarrow b = \frac{aC}{C - 4\pi\epsilon_0 a}$$

$$b = \frac{15,0 \cdot 10^{-2} \cdot 116 \cdot 10^{-12}}{116 \cdot 10^{-12} - 4 \pi \cdot 8,85 \cdot 10^{-12} \cdot 15,0 \cdot 10^{-2}}$$

$$b = 0,175 \text{ m}$$

ou

$$b = 17,5 \text{ cm}$$

$$b) \quad C = \frac{q}{\Delta V}$$

$$q = C \cdot \Delta V$$

$$= 116 \cdot 10^{-12} \cdot 220$$

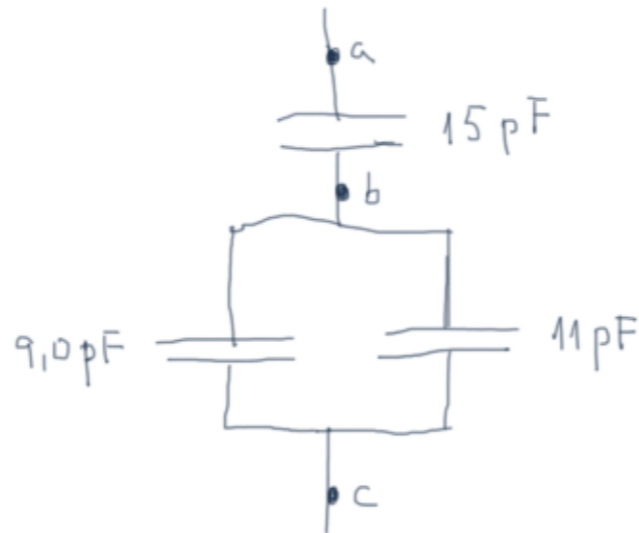
$$q = 25,5 \cdot 10^3 \cdot 10^{-12}$$

$$q = 25,5 \cdot 10^{-9} \text{ C}$$

ou

$$q = 25,5 \text{ nC}$$

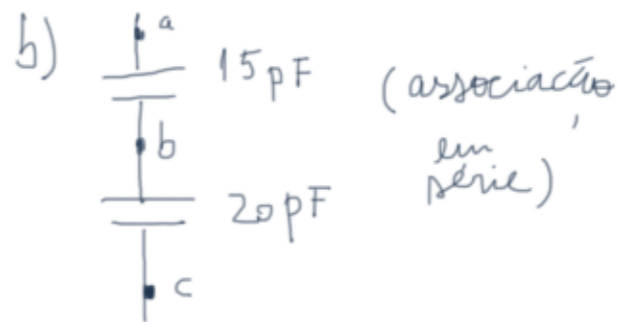
$$24,14, \text{ p. } 127$$



a) Associação em paralelo

$$C_{eq} = 9,0 + 11$$

$$C_{eq} = 20 \text{ pF}$$



$$\frac{1}{C_{eq}} = \frac{1}{15} + \frac{1}{20}$$

$$C_{eq} = \frac{1}{\frac{1}{15} + \frac{1}{20}} \rightarrow C_{eq} = 8,6 \text{ pF}$$

24.27, p.128

$$C = 450 \mu\text{F}$$

$$\Delta V = 295 \text{ V}$$

$$U = ?$$

$$U = \frac{1}{2} \cdot C \cdot \Delta V^2$$
$$= \frac{1}{2} \cdot 450 \cdot 10^{-6} \cdot 295^2$$

$$\boxed{U = 19,6 \text{ J}}$$

24.26, p.128

$$d = 1,50 \cdot 10^{-3} \text{ m}$$

$$q = 0,0180 \cdot 10^{-6} \text{ C}$$

$$\Delta V = 220 \text{ V}$$

$$a) C = \frac{\epsilon_0 \cdot A}{d} = \frac{q}{\Delta V}$$

$$C = \frac{0,0180 \cdot 10^{-6}}{220}$$

$$\boxed{C = 9,00 \cdot 10^{-11} \text{ F}}$$

ou

$$\boxed{C = 90,0 \text{ pF}}$$

$$b) C = \frac{\epsilon_0 \cdot A}{d}$$

$$A = \frac{C \cdot d}{\epsilon_0}$$

$$A = \frac{90,0 \cdot 10^{-12} \cdot 1,50 \cdot 10^{-3}}{8,85 \cdot 10^{-12}}$$

$$\boxed{A = 1,53 \cdot 10^{-2} \text{ m}^2}$$

ou

$$\boxed{A = 153 \text{ cm}^2}$$

c)

$$\text{Ruptura dielétrica do ar} = E_{\text{max}} = 3,0 \cdot 10^6 \frac{\text{V}}{\text{m}}$$

$$\Delta V = E \cdot d$$

$$\Delta V_{\text{max}} = E_{\text{max}} \cdot d = 3,0 \cdot 10^6 \cdot 1,50 \cdot 10^{-3}$$

$$\Delta V_{\text{max}} = 4,5 \cdot 10^3 \text{ V}$$

ou

$$\Delta V_{\text{max}} = 4,5 \text{ kV}$$

d) $q = 0,0180 \cdot 10^{-6} \text{ q}$ $\Delta V = 200 \text{ V}$

$$U = \frac{1}{2} C \Delta V^2 \quad C = \frac{q}{\Delta V}$$

$$= \frac{1}{2} q \cdot \Delta V$$

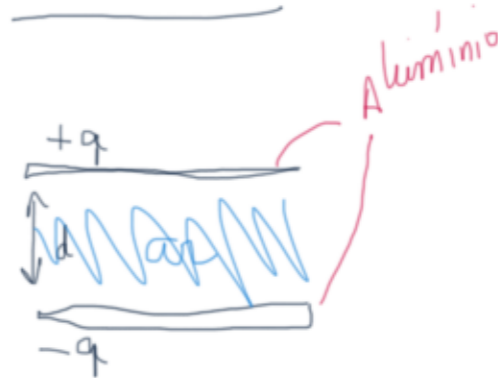
$$= \frac{1}{2} \cdot 0,0180 \cdot 10^{-6} \cdot 200$$

$$U = 0,0180 \cdot 10^{-4} \text{ J}$$

$$= 1,80 \cdot 10^{-2} \cdot 10^{-4} \text{ J}$$

$$U = 1,80 \cdot \mu\text{J}$$

Dieletrico



$$C = \frac{\epsilon_0 A}{d}$$



$$C > C_0 \quad (C = K C_0)$$

$$C_0$$