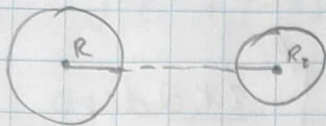


Problema 1



$$Q_1 = 7 \mu\text{C}$$

$$R_2 = 0.4 \text{ m}$$

$$R_1 = 1 \text{ m}$$

$$a) V_1 = V_2$$

$$\frac{kQ_1}{R_1} = \frac{kQ_2}{R_2}$$

$$Q_1 R_2 = Q_2 R_1$$

$$Q_2 = \frac{7 R_2}{R_2 + R_1} = \frac{7(0.4)}{0.7}$$

$$Q_1 + Q_2 = 7 \mu\text{C}$$

$$(7 - Q_2) R = Q_2 R_1$$

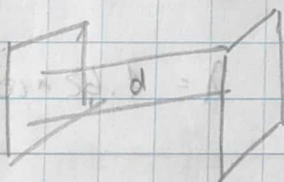
$$Q_2 = 2 \mu\text{C} ; Q_1 = 5 \mu\text{C}$$

$$b) V = 0 ; r = \infty$$

$$V_1 = V_2 = V = \frac{kQ}{R} = \frac{(9 \times 10^9)(5 \times 10^{-6})}{0.5} = 89.9 \text{ kV}$$

$$V = 89.9 \text{ kV}$$

Problema 2:



$$A = 7.00 \text{ cm}^2$$

$$d = 1.80 \text{ mm}$$

$$\Delta V = 200 \text{ V}$$

$$a) \Delta V = E d \Rightarrow E = \frac{\Delta V}{d} = \frac{20}{(1.8 \times 10^{-3})} = 11111.11$$

$$E = 11.11 \text{ kV/m}$$

$$b) E = \frac{\sigma}{\epsilon_0} \Rightarrow \sigma = E \epsilon_0$$

$$\sigma = (11.11 \times 10^3)(8.85 \times 10^{-12})$$

$$\sigma = 9.83 \times 10^{-8}$$

$$\sigma = 98.3 \text{ n C/m}^2$$

c)

$$C = \frac{\epsilon A}{d} = \frac{(8.8542 \times 10^{-12})(7 \times 10^{-4})}{(1.8 \times 10^{-2})} = 3.44 \times 10^{-12} \text{ F}$$

$$C = 3.44 \times 10^{-12} \text{ F}$$

$$d) \frac{Q}{\epsilon_0 A} \Rightarrow Q = \epsilon A E = \sigma A$$

$$Q = (9.83 \times 10^{-8})(7 \times 10^{-4})$$

$$Q = 6.88 \times 10^{-11}$$

$$Q = 68.8 \times 10^{-12} \text{ C}$$

Problema 3

$$L = 50 \text{ m}$$

$$D_1 = 7.68 \text{ m}$$

$$D_2 = 7.27 \text{ m}$$

$$Q = 8.10 \text{ nC}$$

$$r = \frac{d}{2}$$

$$\Delta V = - \int_a^b E ds = - \int_{D_1/2}^{D_2/2} \frac{2K\lambda dr}{r}$$

a)

$$\Delta V = 2K\lambda \ln \left(\frac{D_2/2}{D_1/2} \right) = \frac{2K\lambda Q}{L} \ln \left(\frac{D_2}{D_1} \right)$$

$$C = \frac{Q}{\Delta V} = \frac{Q}{\frac{2K\lambda Q}{L} \ln \left(\frac{D_2}{D_1} \right)} = \frac{L}{2K \ln \left(\frac{D_2}{D_1} \right)}$$

$$C = \frac{50}{2(9 \times 10^9) \ln \left(\frac{7.27}{7.68} \right)} = 2.68 \times 10^{-9}$$

$$C = 2.68 \text{ nF}$$

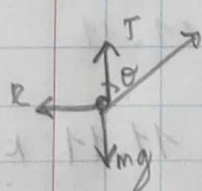
b) $C = \frac{Q}{\Delta V} \Rightarrow \Delta V = \frac{Q}{C} = \frac{(8.10 \times 10^{-6})}{(2.68 \times 10^{-9})} = 3.02 \times 10^3 \text{ V}$

$$\Delta V = 3.02 \text{ kV}$$

c) $\lambda = \frac{Q}{L} = \frac{8.10 \times 10^{-6}}{50} = 1.62 \times 10^{-7}$

$$\lambda = 1.62 \times 10^{-7} \text{ C/m}$$

Problema 4



$$F_e = F_x$$

$$T_y = W$$

$$F_e = qE$$

$$\cos \theta = \frac{T_y}{T}$$

$$\Delta V = dE$$

$$T_y = mg$$

$$\frac{T_y}{\cos \theta} = mg$$

$$T_y = mg \cos \theta$$

$$T_x = T \sin \theta$$

$$T_x = F_e$$

$$qE = F_e$$

$$\Delta V = \frac{dT \sin \theta}{q}$$

$$\Delta V = \frac{dT \sin \theta}{q}$$

Problema 5



$$r_T = \text{Radio Terna } Q = \frac{Q}{V} \rightarrow \int E dA = \frac{Q}{\epsilon_0}$$

$$r_{ex} = r_T$$

$$\int (E) |dA| \cos(\theta)$$

$$E \int dA = \frac{Q_{enc}}{\epsilon_0}$$

$$E = \frac{Q_{enc}}{4\pi\epsilon_0 r^2}$$

$$E A = \frac{Q_{enc}}{\epsilon_0}$$

$$\Delta V = \frac{Q_{enc}}{4\pi\epsilon_0 r^2}$$

$$V_{ab} = V_a - V_b$$

$$V_{ab} = \frac{Q_{enc}}{4\pi\epsilon_0 r_a^2} - \frac{Q_{enc}}{4\pi\epsilon_0 r_b^2}$$

$$V_{ab} = \frac{Q_{enc}}{4\pi\epsilon_0} \left(\frac{1}{r_a^2} - \frac{1}{r_b^2} \right)$$

$$C = \frac{Q}{V_{ab}} = \frac{Q}{\frac{Q_{enc}}{4\pi\epsilon_0 r_T}} = 4\pi\epsilon_0 r_T$$

$$C = 4\pi\epsilon_0 r_T$$