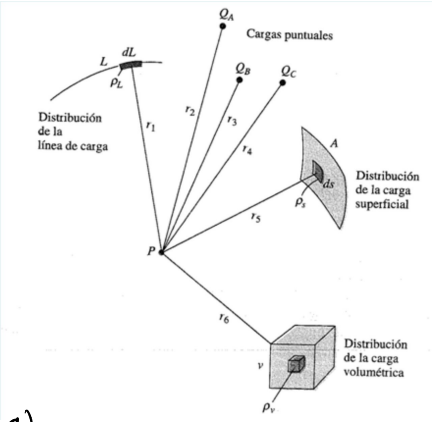
2-



$r_1 = 0.55m, r_2 = 0.65m, r_3 = 0.55m, r_4 = 0.60m, r_5 = 0.50m, r_6 = 0.50m,$

$L = 0.35m, A = 0.03m^2, v = 0.001m^3, \rho_L = 10^{-10}\frac{C}{m}, \rho_s = 10^{-9}\frac{C}{m^2},$

$\rho_v = 10^{-8}\frac{C}{m^3}, Q_A = 2\times10^{-11}C,\ Q_B = 8\times10^{-11}C, Q_C = 3\times10^{-11}C.$

$$\vec{E} = \vec{E}_Q + \vec{E}_{\rho_L} + \vec{E}_{\rho_S} + \vec{E}_{\rho_V}$$

a)

$$\vec{E}_{Q_A} = K\cdot\frac{Q_A}{r_2^2}\vec{a}_r \qquad \vec{E}_{Q_B} = 9\times10^{-9}\cdot\frac{(8\times10^{-11})}{r_3^2}\vec{a}_r$$

$$\vec{E}_{Q_A} = 9\times10^{-9}\cdot\frac{2\times10^{-11}}{r_2^2}\vec{a}_r \qquad \Rightarrow \vec{E}_{Q_B} = \frac{7,2\times10^{-19}}{r_3^2}\vec{a}_r \ \ V/m^2$$

$$\Rightarrow \vec{E}_{Q_A} = \frac{1,8\times10^{-19}}{r_2^2}\vec{a}_r \qquad \vec{E}_{Q_C} = 9\times10^{-9}\frac{(3\times10^{-11})}{r_4^2}\vec{a}_r$$

$$\Rightarrow \vec{E}_{Q_C} = \frac{2,7\times10^{-19}}{r_4^2}\vec{a}_r$$

Lineal

$$\rho_L = \frac{Q}{L} \rightarrow \qquad Q = \rho_L\cdot L$$

$$Q = (10^{-10}\frac{C}{m})\cdot 0,35m$$

$$Q = 3,5\times10^{-11}\ C$$

$$\vec{E}_{\rho_L} = K\frac{Q}{r_1^2}\vec{a}_r = 9\times10^{-9}\cdot\frac{3,5\times10^{-11}}{r_1^2}$$

$$\Rightarrow \vec{E}_{\rho_L} = \frac{3,15\times10^{-19}}{r_1^2}$$

$E\rho_S$

$$\rho_S = \frac{Q}{A} \Rightarrow Q = \rho_S \cdot A$$

$$Q = \left(10^{-9}\ \frac{C}{m^2}\right) \cdot (0{,}03\ m^2)$$

$$Q = 3 \times 10^{-11}\ C$$

$$\vec{E}_{\rho_S} = K \frac{Q}{r_S^2} \vec{a_r} = 9 \times 10^{-9} \cdot \frac{(3 \times 10^{-11})}{r_S^2} \vec{a_r}$$

$$\vec{E}_{\rho_S} = \frac{2{,}7 \times 10^{-19}}{r_S^2} \vec{a_r}$$

$E\rho_V$

$$Q = \iiint \rho_V \, dV \Rightarrow \rho_V = \frac{Q}{V} \rightsquigarrow Q = \rho_V \cdot V$$

$$Q = 10^{-8} \cdot 0{,}001$$

$$Q = 1 \times 10^{-11}\ C$$

$$E_{\rho_V} = K \frac{Q}{r_6^2} \vec{a_r} = 9 \times 10^{-9} \cdot \frac{1 \times 10^{-11} C}{r_6^2} \vec{a_r}$$

$$E_{\rho_V} = \frac{9 \times 10^{-20}}{r_6^2}$$

$$\vec{E}(P) = \vec{E}_{Q_A} + \vec{E}_{Q_B} + \vec{E}_{Q_C} + \vec{E}_{\rho_L} + \vec{E}_{\rho_S} + \vec{E}_{\rho_V}$$

$$\vec{E}(P) = \frac{1{,}8 \times 10^{-1}}{r_2^2} + \frac{9}{r_3^2} + \frac{7{,}2 \times 10^{-19}}{r_3^2} + \frac{2{,}7 \times 10^{-19}}{r_4^2} + \frac{2{,}7 \times 10^{-19}}{r_5^2} + \frac{9 \times 10^{-20}}{r_6^2} + \frac{3{,}15 \times 10^{-19}}{r_1^2}$$

R/a $\left[\frac{N}{C}\right]$

$$\vec{E}(P) = \frac{1{,}8\times10^{-19}}{r_2^2} + \frac{7{,}2\times10^{-19}}{r_3^2} + \frac{2{,}7\times10^{-19}}{r^2} + \frac{2{,}7\times10^{-19}}{r_5^2} + \frac{9\times10^{-20}}{r_6^2} + \frac{3{,}15\times10^{-19}}{r_1^2}$$

$$\vec{E}(P) = \frac{1{,}8\times10^{-19}}{(0{,}65m)^2} + \frac{7{,}2\times10^{-19}}{(0{,}55)^2} + \frac{2{,}7\times10^{-19}}{(0{,}60)^2} + \frac{2{,}7\times10^{-19}}{(0{,}50)^2} + \frac{9\times10^{-20}}{(0{,}50)^2} + \frac{3{,}15\times10^{-19}}{(0{,}55)^2}$$

$$\boxed{\vec{E}(P) = 4{,}96\times10^{-18}\ \frac{N}{C}}$$ R/ b