5. Дано: $f = 1 \times 10^7$ Гц, $\sigma = 1 \times 10^{-4}$ См/м, $\varepsilon = 9$.

$$E = E_m \cos(\omega t - kx)$$

Найти: $\frac{j_n}{j_{cm}}$

$$j_n = \sigma E_m$$

$$j_c = \frac{dD}{dt} = \varepsilon\varepsilon_0 \frac{dE}{dt} = -\varepsilon\varepsilon_0 \omega E_m \sin(\omega t - kx)$$

$$j_{cm} = \varepsilon\varepsilon_0 \omega E_m$$

$$\frac{j_n}{j_{cm}} = \frac{\sigma E_m}{\varepsilon\varepsilon_0 \omega E_m} = \frac{\sigma}{\varepsilon\varepsilon_0 \omega} = \frac{\sigma}{2\pi f \varepsilon\varepsilon_0} = 0.02$$

6. Дано: $\Omega = 60$ Ом, $\varepsilon = 4$

$$\Omega = \frac{1}{2\pi} \ln\left(\frac{D}{d}\right) \sqrt{\frac{\mu\mu_0}{\varepsilon\varepsilon_0}}$$

$$\begin{cases} C_x = \dfrac{2\pi\varepsilon\varepsilon_0}{\ln\left|\frac{D}{d}\right|} \end{cases}$$

$$\Rightarrow C_x = \frac{2\pi\varepsilon\varepsilon_0}{2\pi\Omega} \sqrt{\frac{\varepsilon\varepsilon_0}{\mu\mu_0}} \approx$$

$$L_x = \Omega^2 C_x = \frac{2\pi\varepsilon\varepsilon_0}{\Omega} \sqrt{\frac{\varepsilon\varepsilon_0}{\mu\mu_0}} \approx$$

$$\Rightarrow C_x = \frac{\varepsilon\varepsilon_0}{\Omega} \sqrt{\frac{\mu\mu_0}{\varepsilon\varepsilon_0}} \approx 1 \times 10^{-10} \text{ Ф}$$

$$L_x = \Omega^2 C_x = \Omega \sqrt{\mu\mu_0\varepsilon\varepsilon_0} \approx 4 \times 10^{-7} \text{ Гн}$$