

Kolokwium 2, zadanie 1, grupa C

Rozwiązanie:

$$\begin{cases} \xi = \sqrt{\frac{L}{C}} \Rightarrow L = C\xi^2 \\ \omega_0 = \frac{1}{\sqrt{LC}} \end{cases}$$

$$\omega_0 = \frac{1}{\sqrt{C\xi^2 C}} = \frac{1}{\xi C} \Rightarrow C = \frac{1}{\xi\omega_0} = \frac{1}{100 \cdot 10^3 \cdot 1e^6} = 10 \cdot 10^{-12} = \underline{\underline{10 \text{ pF}}}$$

$$L = C\xi^2 = \frac{\xi}{\omega_0} = \frac{100 \cdot 10^3}{100 \cdot 10^4} = \underline{\underline{0,1 \text{ H}}}$$

1,5 pkt

$$Q = \frac{\xi}{R} \Rightarrow R = \frac{\xi}{Q} = \frac{100 \cdot 10^3}{200} = \underline{\underline{500 \Omega}}$$

1 pkt

$$\zeta = Q \cdot \nu \approx Q \frac{2(\omega - \omega_0)}{\omega_0} = \frac{200 \cdot 2(0,0225\omega_0 - \omega_0)}{\omega_0} = \frac{200 \cdot 0,045}{1} = 9$$

$$\zeta = 200 \cdot \frac{2(1,01\omega_0 - \omega_0)}{\omega_0} = 400 \cdot 0,01 = 4$$

$$\frac{|J|}{|J_v|} = \frac{1}{\sqrt{1+\zeta^2}} = \frac{1}{\sqrt{1+16}} = \frac{1}{\sqrt{17}}$$

2 pkt

$$u_L = jQE = j200 \cdot 2e^{j\frac{\pi}{4}} = 400e^{j\frac{3}{4}\pi} \text{ V}$$

$$u_C = -jQE = -j200 \cdot 2e^{j\frac{\pi}{4}} = 400e^{-j\frac{\pi}{4}} \text{ V}$$

1,5 pkt

6 pkt.