

Kolokwium 2, zadanie 1, grupa D

Rozwiązanie:

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

$$\omega_0 = \frac{1}{\sqrt{C\beta^2 C}} = \frac{1}{\beta C} \Rightarrow C = \frac{1}{\beta \omega_0} = \frac{1}{100 \cdot 10^3 \cdot 2 \cdot 10^6} = \frac{1}{200} \cdot 10^{-9} = \underline{\underline{5 \text{ pF}}}$$

$$L = C\beta^2 = \frac{\beta}{\omega_0} = \underline{\underline{0,05 \text{ H}}}$$

1,5 pkt

$$Q = \frac{1}{\beta G} \Rightarrow G = \frac{1}{Q \cdot \beta} = \frac{1}{500 \cdot 100 \cdot 10^3} = \frac{1}{5} \cdot 10^{-7} = \underline{\underline{20 \text{ nS}}} \quad 1 \text{ pkt}$$

$$\xi = Q \cdot \sigma \approx Q \cdot \frac{2(\omega - \omega_0)}{\omega_0} = 500 \cdot \frac{2(1,004\omega_0 - \omega_0)}{\omega_0} = 500 \cdot 0,08 = 4$$

$$\frac{|U|}{|U_{\text{ref}}|} = \frac{1}{\sqrt{1+\xi^2}} = \frac{1}{\sqrt{1+16}} = \frac{1}{\sqrt{17}}$$

2 pkt

$$I_c = jQJ = j500 \cdot 2e^{j\pi/3} = 1000e^{j\pi/6} \text{ mA} = e^{j\pi/6} \text{ A}$$

$$I_L = -jQJ = -j500 \cdot 2e^{j\pi/3} = 1000e^{-j\pi/6} \text{ mA} = e^{-j\pi/6} \text{ A}$$

1,5 pkt

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6 pkt