

Kolokwium 2, zadanie 1, grupa A

Rozwiązanie:

$$\frac{|J|}{|J_r|} = \frac{1}{\sqrt{1+\xi^2}} = \frac{1}{\sqrt{10}}$$

$$1+\xi^2 = 10$$

$$\xi = 3 \quad (\text{ponieważ } \omega > \omega_0) \quad 1 \text{ pkt}$$

$$\xi = Q \cdot \nu \approx Q \frac{2(\omega - \omega_0)}{\omega_0} = 3$$

$$\frac{2Q(1,005\omega_0 - \omega_0)}{\omega_0} = 3$$

$$Q \cdot 0,005 = \frac{3}{2}$$

$$\underline{Q = 300} \quad 1 \text{ pkt}$$

$$Q = \frac{\rho}{R} \Rightarrow \rho = Q \cdot R = 300 \cdot 20 = \underline{\underline{6 \text{ k}\Omega}} \quad 1 \text{ pkt}$$

$$\rho = \sqrt{\frac{L}{C}} \Rightarrow C = \frac{L}{\rho^2} = \frac{36 \cdot 10^{-3} \text{ H}}{36 \cdot 10^6 \Omega^2} = \underline{\underline{1 \text{ nF}}} \quad 1 \text{ pkt}$$

$$\omega_0 = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{36 \cdot 10^{-3} \cdot 10^{-9}}} = \frac{1}{6} \cdot 10^6 \text{ rad/s} = \underline{\underline{\frac{1}{6} \text{ Mrad/s}}} \quad 1 \text{ pkt}$$

$$\Delta \omega|_{3\text{dB}} = \frac{\omega_0}{Q} = \frac{\frac{1}{6} \cdot 10^6}{300} = \frac{1}{18} \cdot 10^4 = \underline{\underline{\frac{10}{18} \text{ krad/s}}} \quad 1 \text{ pkt}$$

6 pkt