task_uzbbnoz8abe6201d_with_calculation

Student Group

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Exercise E5 Impedances at Frequencies
(written test, approx. 14 % of a 60-minute written test, SS2023)

At which frequencies show the following components the same absolute value of the impedance as a capacitor with $C_3 = 5.6 ~\rm nF$.
Result

1. An inductor with $X_{L1} = 60 ~\rm m\Omega$ and $L_1 = 15.9 ~\rm \mu H$.

Solution

Solution

\begin{align*} f_1 &= 600 ~{\rm kHz} \end{align*}

kHz}\end{align*}

\begin{align*} X_{L1} &= \omega_1 \cdot L = 2\pi f_1 \cdot L_1 \\ \rightarrow f_1 &= {{X_{L1}}\over{2\pi \cdot L_1}} \\ &= {{60 ~\rm m\Omega}\over{2\pi \cdot 15.9 ~\rm \mu H}} \\ &= {{60 \cdot 10^{-3}}\over{2\pi \cdot 15.9 \cdot 10^{-6}}} \rm {{ {V}\over{A}} } \over { {Vs}\over{A}}}} \\ \end{align*}

\begin{align*} X_{C3} &= X_{C2} ... {1}\over{\omega_3 \cdot C_3} ... \rightarrow f_3 ... \end{align*}