

task_uzbbnoz8abe6201d_with_calculation

Student Group

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exam ee1 SS2023

Exercise E1 Impedances at Frequencies (written test, approx. 14 % of a 60-minute written test, SS2023)

At an inductor with $X_{L1} = 60 \text{ m}\Omega$ and a capacitor with $X_{C2} = 300 \text{ }\Omega$ at $f = 50 \text{ kHz}$, the voltage V across the capacitor is $V_C = 10 \text{ V}$. Calculate the current I through the circuit.

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

Solution
Solution

$$f = 50 \text{ kHz} \quad X_{L1} = 60 \text{ m}\Omega \quad X_{C2} = 300 \text{ }\Omega$$

$$X_{L1} = \omega L_1 \quad X_{C2} = \frac{1}{\omega C_2}$$

$$L_1 = \frac{X_{L1}}{\omega} = \frac{60 \text{ m}\Omega}{2\pi \cdot 50 \text{ kHz}} = 15.9 \text{ }\mu\text{H}$$

$$I = \frac{V_C}{X_{C2}} = \frac{10 \text{ V}}{300 \text{ }\Omega} = 33.3 \text{ mA}$$

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