

task_uzbbnoz8abe6201d_with_calculation

Student Group

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Exercise E17 Impedances at Frequencies**(written test, approx. 14 % of a 60-minute written test, SS2023)**

At a high school with a class of 50 students, the following impedances are given: $Z_1 = 10 \Omega$, $Z_2 = 20 \Omega$, $Z_3 = 30 \Omega$, $Z_4 = 40 \Omega$, $Z_5 = 50 \Omega$. The results are as follows: $I_1 = 10 \text{ A}$, $I_2 = 20 \text{ A}$, $I_3 = 30 \text{ A}$, $I_4 = 40 \text{ A}$, $I_5 = 50 \text{ A}$.

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

Solution

Solution

$$\begin{aligned} f_0 &= 50 \text{ Hz} \\ Z_1 &= 10 \Omega \\ Z_2 &= 20 \Omega \\ Z_3 &= 30 \Omega \\ Z_4 &= 40 \Omega \\ Z_5 &= 50 \Omega \end{aligned}$$

$$\begin{aligned} X_{L1} &= \omega L_1 \\ L_1 &= \frac{X_{L1}}{\omega} \\ L_1 &= \frac{60 \text{ m}\Omega}{2\pi \cdot 50 \text{ Hz}} \\ L_1 &= 15.9 \text{ }\mu\text{H} \end{aligned}$$

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