

task_c9fj1si7l797equs_with_calculation

Student Group

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impedance, phasor, cutoff, exam ee1 SS2023

Exercise E6 Complex voltage dividers

(written test, approx. 16 % of a 60-minute written test, SS2023)

7. Draw the circuit diagram of the following circuit with the resulting phasor for the total impedance. Resulting $\underline{U}_O$. Choose an appropriate scaling factor and write it down.

- $R = 1.1 \text{ k}\Omega$

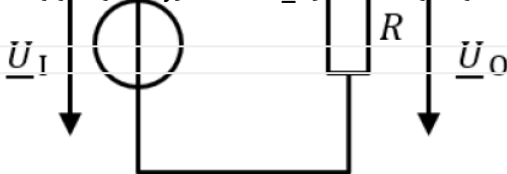
Solution $L = 3.5 \text{ mH}$

Solution $\underline{U}_I = 5 \text{ V}$

$$\underline{Z} = 50 \text{ k}\Omega$$

$$\underline{U}_O = 0.5 \text{ V} - j \cdot 1.5 \text{ V}$$

At the cutoff frequency the absolute values of impedances $|\underline{Z}_L|$ is equal to $|\underline{Z}_R|$. This leads to $\frac{1}{\omega L} = R$ $\Rightarrow \omega = \frac{1}{R \cdot L}$ $\Rightarrow f = \frac{1}{2\pi R \cdot L}$ $\Rightarrow f = \frac{1}{2\pi \cdot 1.1 \cdot 10^3 \cdot 3.5 \cdot 10^{-3}}$ $\Rightarrow f \approx 40.8 \text{ Hz}$



.. Calculate the impedance $\underline{Z}_L$.

Solution

$$\underline{Z}_L = j \cdot \omega L = j \cdot 2\pi \cdot 150 \text{ kHz} \cdot 3.5 \text{ mH}$$

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