

task_ti7loik6aurfewkb_with_calculation

Student Group

First Name	Surname	Matrikel Nr.

Table of Contents

Exercise E1 Magnetic Flux Density (written test, approx. 6 % of a 120-minute written test, SS2021)	2
--	---

magnetostatic, flux density, exam ee2 SS2021

Exercise E1 Magnetic Flux Density (written test, approx. 6 % of a 120-minute written test, SS2021)

A) The electric water is operated for an experiment in the laboratory. A resistor $R = 100 \text{ }\Omega$ with a current of $\hat{I} = 100 \text{ A}$ is operated.

What is the distance to the cable and the cable to the body? (3 points, independent)

The figure below shows the supply line between A and B and its position.

$$B = 0.12 \text{ A/m} \cdot 10^{-7} \left\{ \frac{\text{Vs}}{\text{Am}} \right\}, \mu_r = 1$$

The formula for the magnetic field strength can be rearranged:
$$H = \frac{I}{2\pi \cdot r} \quad r = \frac{I}{2\pi \cdot H}$$

Again, the magnetic flux density B is given as: $B = \mu_0 \mu_r H$
Therefore:
$$r = \frac{\mu_0 \mu_r \left\{ I \right\}}{2\pi \cdot B} \quad r = \frac{4\pi \cdot 10^{-7} \left\{ 100 \text{ A} \right\}}{2\pi \cdot 100 \cdot 10^{-6} \left\{ \text{T} \right\}}$$

a) What is the highest magnetic flux density through the line in your body? (3 points)

Path

The magnetic field strength for a conducting wire is given as:

$$\begin{align*} H &= \frac{I}{2\pi \cdot r} \end{align*}$$

The magnetic flux density B is given as: $B = \mu_0 \mu_r H$

Here, the maximum current is $\hat{I} = 100 \text{ A}$ and the distance to the cable is $r = \sqrt{(0.1 \text{ m})^2 + (0.4 \text{ m})^2} = 0.412... \text{ m}$.

$$\begin{align*} B &= 4\pi \cdot 10^{-7} \frac{\text{Vs}}{\text{Am}} \cdot 1 \\ &\cdot \frac{100 \text{ A}}{2\pi \cdot 0.412... \text{ m}} \end{align*}$$

From:

<https://mexle.te.hs-heilbronn.de/> - MEXLE Wiki

Permanent link:

https://mexle.te.hs-heilbronn.de/ee2/task_ti7loik6aurfewkb_with_calculation?rev=1719835260

Last update: **2024/07/01 14:01**

