

task_w3wf215v2u98ty07_with_calculation

Student Group

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Table of Contents

Exercise E1 Efficiency (written test, approx. 14 % of a 60-minute written test, SS2023) 2

efficiency, charges, power, exam ee1 SS2023

Exercise E1 Efficiency

(written test, approx. 14 % of a 60-minute written test, SS2023)

A. (10 points) A battery with an electromotive force \mathcal{E} and an internal resistance R_i is connected to a load resistor R_L . The battery shall provide energy for a device with an load resistance of $R_L = 2 + 0.05 R_i$. The following values are from the data sheet:

begin{align} \mathcal{E} &= 3.5 \text{ V} \\ R_i &= 0.05 \Omega \\ R_L &= 2.175 \Omega \end{align}

1. Draw a circuit diagram with the internal resistance and an external load.

2. Calculate the efficiency η of the battery for the given load.

3. Determine the maximum efficiency η_{max} for the battery and the corresponding load resistance R_L .

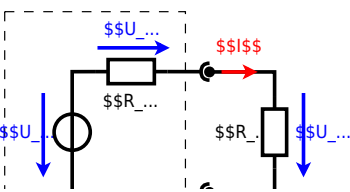
4. Draw a circuit diagram with the internal resistance and an external load.

5. Calculate the efficiency η of the battery for the given load.

6. Determine the maximum efficiency η_{max} for the battery and the corresponding load resistance R_L .

7. Calculate the efficiency η of the battery for the given load.

8. Determine the maximum efficiency η_{max} for the battery and the corresponding load resistance R_L .



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