

task_w3wf215v2u98ty07_with_calculation

Student Group

First Name	Surname	Matrikel Nr.

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)

8. (14.00 Points) A battery with an open-circuit voltage $U_S = 3.5 \text{ V}$ and an internal resistance $R_i = 2 \text{ } \Omega$ is connected to a load resistor $R_L = 3 \text{ } \Omega$. The battery shall provide energy for a device with an load resistance of $R_L = 2 \text{ } \Omega$. The following values are from the battery data sheet.

begin{align*} U_S &= 3.5 \text{ V} \\ R_i &= 2 \text{ } \Omega \\ R_L &= 3 \text{ } \Omega \end{align*}

Solution: (14.00 Points) With the circuit diagram (see Fig. 1) the following values are obtained:

• Verify: $U_S = 3.5 \text{ V}$, $R_i = 2 \text{ } \Omega$, $R_L = 3 \text{ } \Omega$

lowest efficiency for highest load resistance $R_L = 3 \text{ } \Omega$ (see Fig. 1)

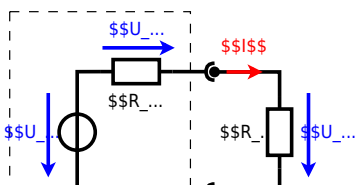
.. Draw the equivalent circuit diagram with the internal resistance and an external load.

label voltage and current: $Q = 2.6 \text{ Ah}$

begin{align*} \eta &= \frac{U_L \cdot I}{U_S \cdot I} = \frac{U_L}{U_S} \end{align*}

$= 1 - \frac{R_i}{R_L + R_i} = 1 - \frac{2}{3 + 2} = 1 - 0.4 = 0.6$

Result: $\eta = 0.6$



From:

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

Permanent link:

https://wiki.mexle.te.hs-heilbronn.de/ee1/task_w3wf215v2u98ty07_with_calculation

Last update: **2023/07/24 18:39**

