20. Internationale Elektrotechnik-Olympiade der Schulen der Euroregion Neisse

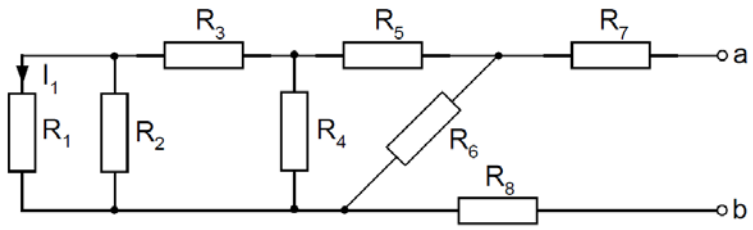
NEISSE - ELEKTRO 2000

Name:.....

1	2	3	4	5	Σ

Tasks fort he finale test
90min ; with formula sheet (English edition)

1
Given is the electrical circuit according to figure **1**



R_1 up to $R_8 = 2\ \Omega$

and

$I_1 = 10$ A

Figure 1

Calculate the amount of R_{ab} and the amounts of all currents from I_1 to I_8 and all voltages from U_1 to U_8.

2
Calculate the values of the current I_2 and the current I_4 for the electrical circuit according to figure 2

$R_1 = 1\ \Omega$ $R_2 = 1{,}5\ \Omega$ $R_3 = 6\ \Omega$ $R_4 = 1{,}5\ \Omega$ $U_{q1} = 24$ V $U_{q2} = 18$ V

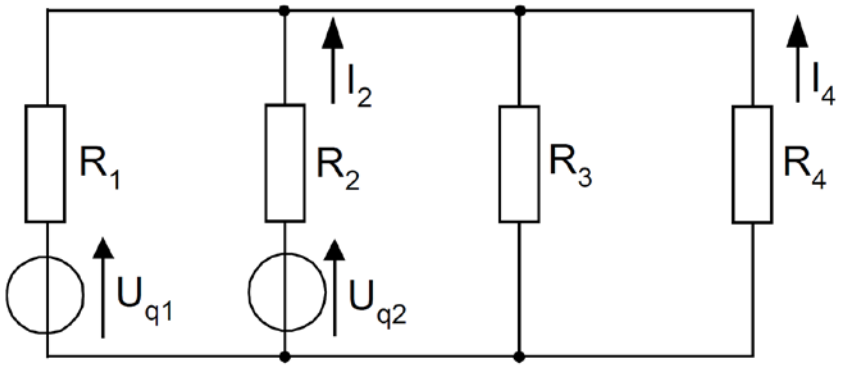


Figure 2

3

A coil (N = 300) according to figure 3 will move with a constant speed v = 1,6 m/s through a homogeneous magnetical field (B = 1,2 T).

Calculate the maximum voltage during this movement.

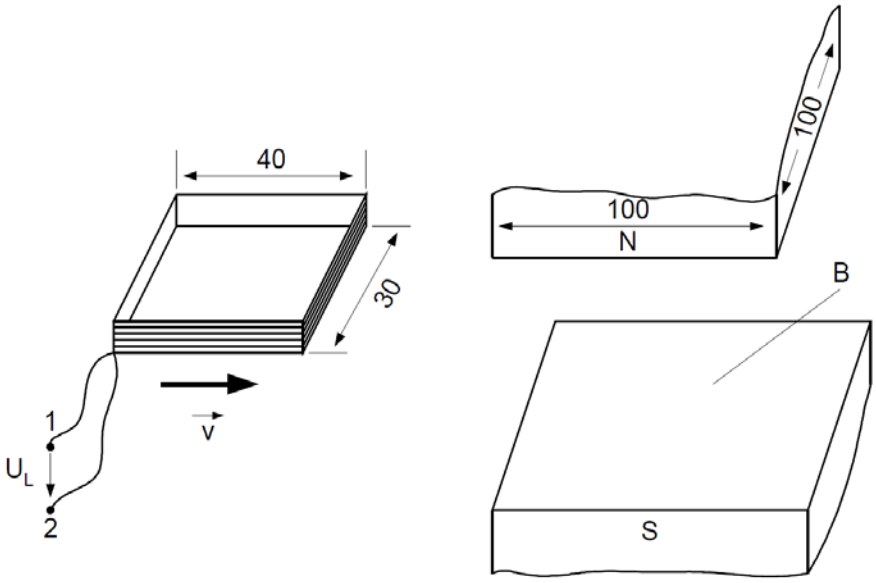


Figure 3

4

The AC circuit given by figure 4 is supplied by a voltage of $u = \sqrt{2} \cdot 100\,V \cdot \cos\omega t$ with a frequency of f = 1000 Hz.
The values, indicated on the measuring instruments are: U = 100 V I = 4,6 A and P = 347 W.

Calculate the values of the resistance R_s and the capacitance C_s.

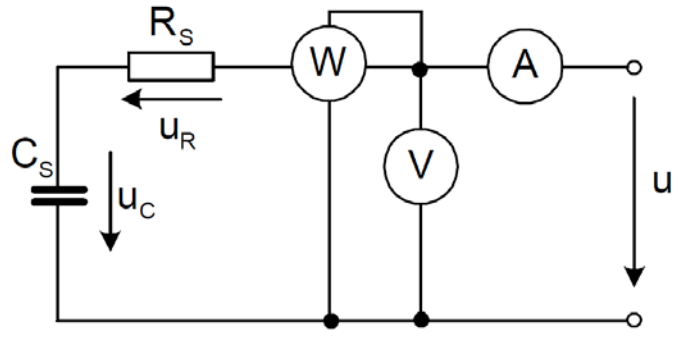


Figure 4

5

A very long superconducting cable with a very small diameter can carry a maximum current of I = 4000 A.

Calculate the magnetic field strength H and the magnetic flux density B for this case in a distance of 1 m and 5 m and the minimum distance to the cable where B is not less than 100 μT.