NEISSE - ELEKTRO 2000

Name: --

1	2	3	4	5	Σ

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

1

Given is the electrical DC circuit according to figure **1**
Calculate the amounts of all currents (I_{total} and I_1 to I_{11}) and all voltages

R_1 - R_{11} = 10 Ω
U_q = 20 V
R_i = 7,5 Ω
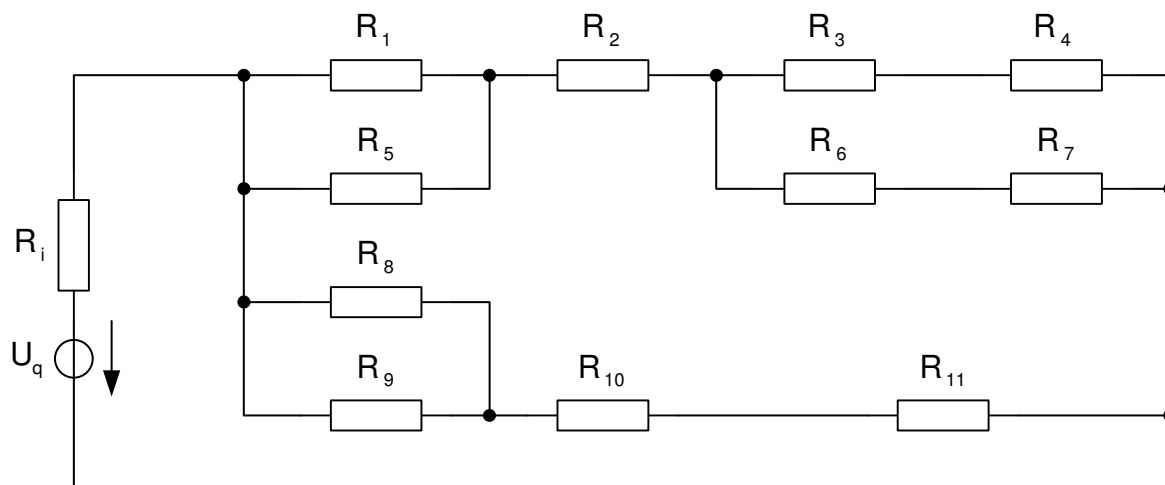
Figure 1

2

An electrical aluminium conductor ($\kappa = 35$ m/ Ω mm²   and $\alpha_{20} = 3{,}77 \cdot 10^{-3}$ K^{-1}) with a diameter of d = 6 mm and a length of l = 2 m is connected to a voltage source of U_q = 400 V (the resistance of the connecting wires is negligible)

a) Calculate the resistance R of this conductor having a temperature of 20 degrees celsius!
b) Calculate the resistance R of this conductor having a temperature of 120 degrees celsius!
c) Calculate the current I in the conductor for both temperatures!
d) Calculate the magnetic field strength H at a distance from the conductor of a = 10 cm in the middle of the length l = 2 m (see figure 2) for both currents!
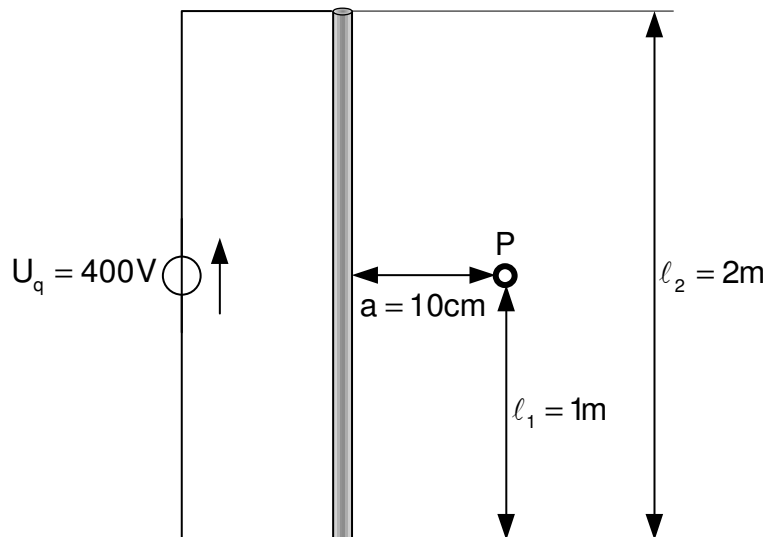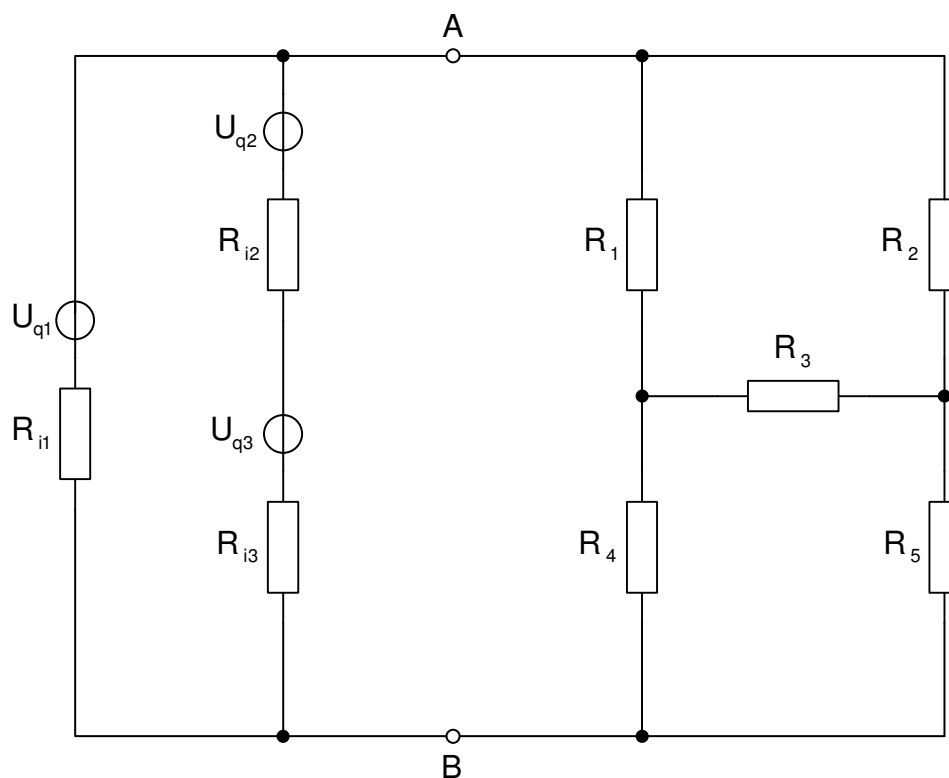
Figure 2

3

Simplify the DC circuit in figure 3 to a basic circuit having only one voltage source and one load resistance and calculate the characteristic parameters U_q, R_i, R_a, I and U_{AB} !

$R_1 = 1\ \Omega$, $R_2 = 2\ \Omega$, $R_3 = 3\ \Omega$, $R_4 = 2\ \Omega$, $R_5 = 1\ \Omega$,

$U_{q1} = 12\ V$, $R_{i1} = 3\ \Omega$, $U_{q2} = 5\ V$, $R_{i2} = 1,5\ \Omega$, $U_{q3} = 7\ V$, $R_{i3} = 2,5\ \Omega$,

Figure 3

4

A black box containing two basic circuit elements (R, L or C) is supplied by an AC
voltage of U = 24 V (f = 50 Hz) and a current of I = 1,1 A
The measured reactive power is Q = 17,5 var

Describe the black box behaviour by a drawing of these two basic circuit elements
(R, L or C) and calculate their values!

5

A metallic rod is moving on two metallic rails at a constant speed v = 0,5 m/s through
a homogeneous magnetic field B = 1,2 T (see Figure 4)

Calculate the voltage indicated by the volt meter in case of a distance between the
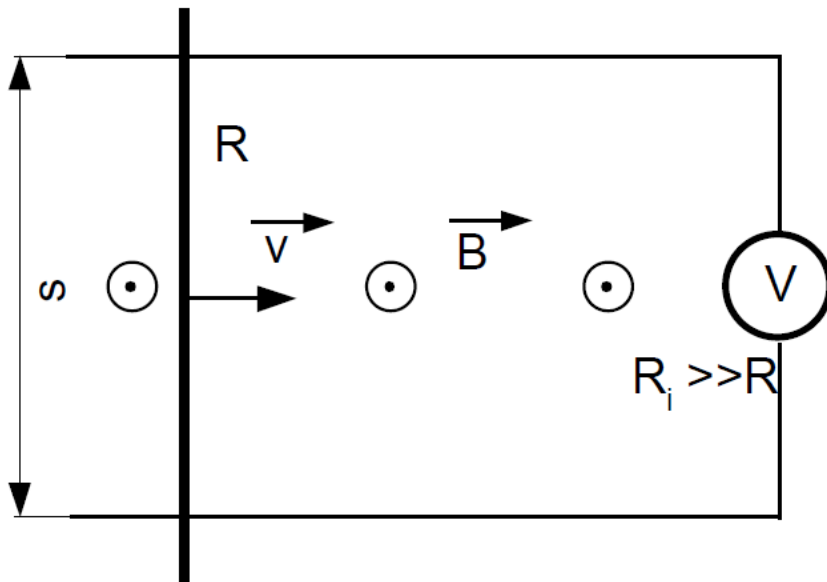rails of s = 40 cm

Figure 4