

NEISSE - ELEKTRO 2000

Name:

1	2	3	4	5	Σ

Tasks for the finale test
90min; with formula sheet (English edition)

1

Given is the electrical circuit according to figure 1

$$U_{q1} = 10 \text{ V} \quad R_{i1} = 1 \Omega$$

$$U_{q2} = 10 \text{ V} \quad R_{i2} = 1 \Omega$$

$$R_1 \cdots R_7 = 10 \Omega$$

Calculate the values of all currents from I_1 to I_7 and all voltages from U_1 to U_7 and of U_{qAB} , R_{iAB} , U_{AB} , R_{aAB} !

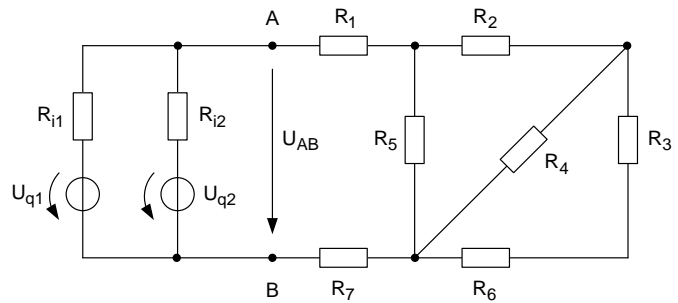


figure 1

2

The following circuit is given (figure 2).

A resistance of $R_a = 10,85 \Omega$ is measured between the terminal a1 and a2. The resistance between b1 and b2 is $R_b = 13,02 \Omega$.

$$R_1 + R_2 = R_{12} = 9,47 \Omega$$

Calculate the values of R_1, R_2, R_3 !

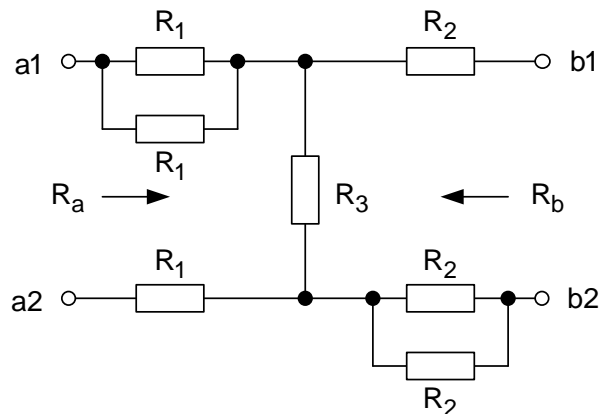


figure 2

3

Given are three equals voltages sources according to fig. 3 with $U_q = 12\text{ V}$ and $R_i = 2\ \Omega$.

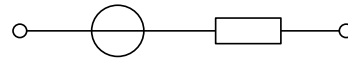


figure 3

Calculate for the 4 combination of this 3 voltage sources according to fig. 4 the resulting values of U_{qAB} and R_{iAB} .

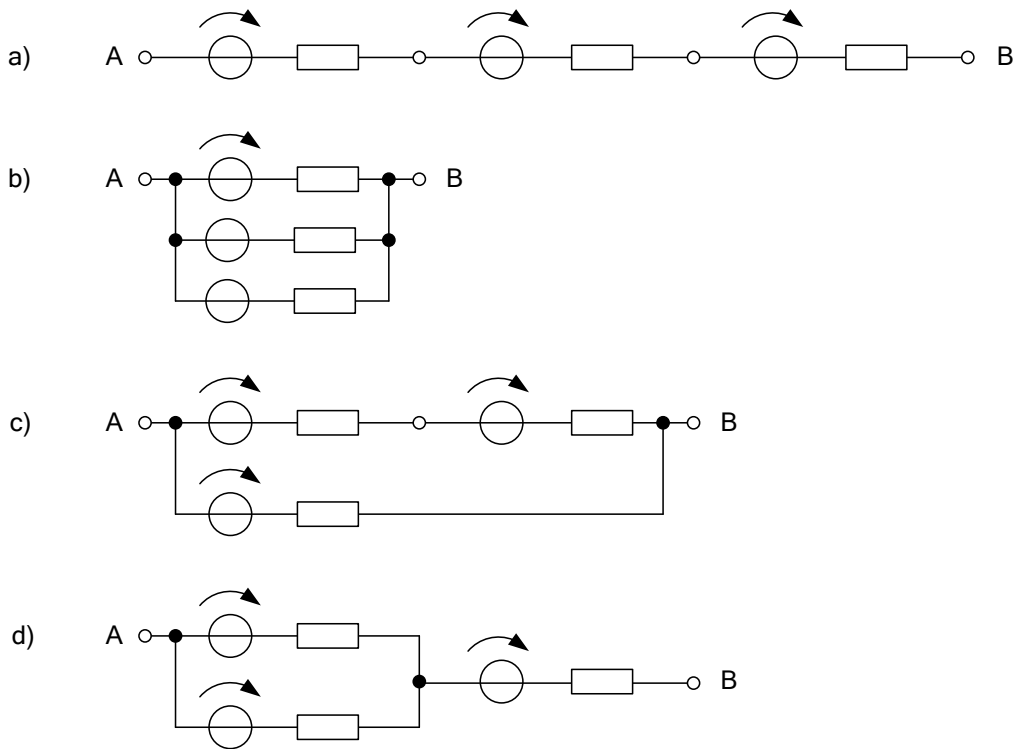


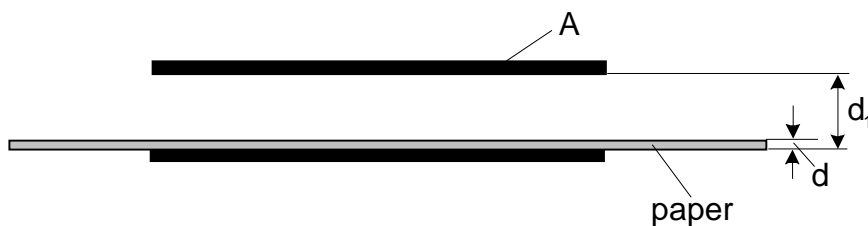
figure 4

4

A sheet of paper with a thickness of $d = 0,2\text{ mm}$ is put into a plate capacitor (area $A = 0,4\text{ m}^2$), distance $d_1 = 1\text{ mm}$, permittivity (vacuum) $\epsilon_0 = 8,85 \cdot 10^{-12}\text{ As/Vm}$).

The measured capacity is $C = 4,0\text{ nF}$.

Calculate the permittivity ϵ_r of the paper!



5

The magnetic flux Φ in the given iron core is produced by the field coil (number of windings N_0) with current i :

$$\Phi(t) = 20 \cdot 10^{-4} \text{ Vs} \cdot \sin \omega t$$

with frequency $f = 50 \text{ Hz}$

$$N_0 = 200 \quad N_1 = 10 \quad N_2 = 100$$

a)

Calculate the magnetic resistance R_m of the iron core. The current in the field coil is given by:

$$i = 20 \text{ mA} \cdot \sin \omega t$$

b)

Calculate the voltages u_{ab} and u_{cd} !

