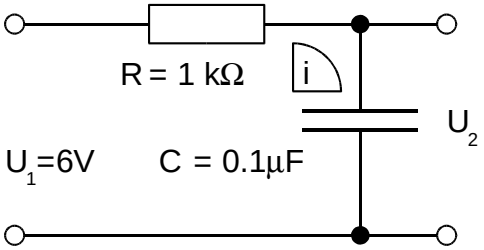
U

1.



a: f_A=2000Hz
X_A=……Ω
Z_A=……Ω
U_{2A}=……V
b: I =……A
c: U_2 => f diagram

$C = 0.1\mu F = 0.1 \cdot 10^{-6} F = 10^{-7} F$

$R = 1k\Omega = 1 \cdot 10^{3}\Omega = 10^{3}\Omega$

a:

$$X_A = \frac{1}{2\pi \cdot f_A \cdot C} = \frac{1}{2\pi \cdot 2000 \cdot 10^{-7}} = 795.77\Omega$$

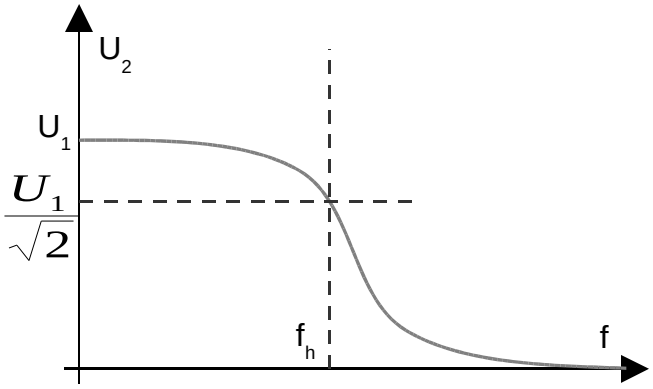
$$Z_A = \sqrt{R^2 + X_A{}^2} = \sqrt{\left(10^3\right)^2 + \left(795.77\right)^2} = 1278\Omega$$

$$U_{2A} = i \cdot X_A$$

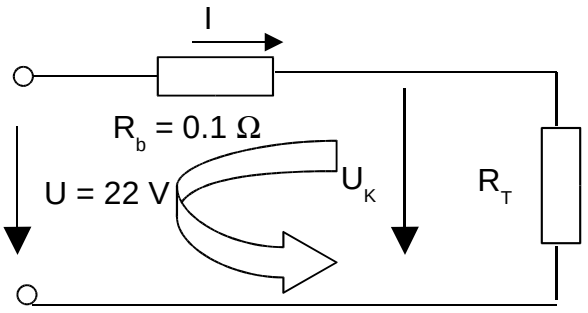
b: $$i = \frac{U}{Z_A} = \frac{6}{1278} = 4.695 \cdot 10^{-3} A = 4.695 mA$$

a: $$U_{2A} = i \cdot X_A = 4.695 \cdot 10^{-3} \cdot 795.77 = 3.736V$$

c:



2



a: I_1 = 20A
R_{T1}=……Ω
U_{K1}=……Ω
b: I_2 = 10A
R_{T2}=……Ω
U_{K2}=……Ω
c: I_Z = ……Ω
d: U_k => I, képlet

a: $I_1 = \frac{U}{R_B + R_{T1}} \Rightarrow R_b + R_{T1} = \frac{U}{I_1} \Rightarrow R_{T1} = \frac{U}{I_1} - R_b = \frac{22}{20} - 0.1 = 1\Omega$

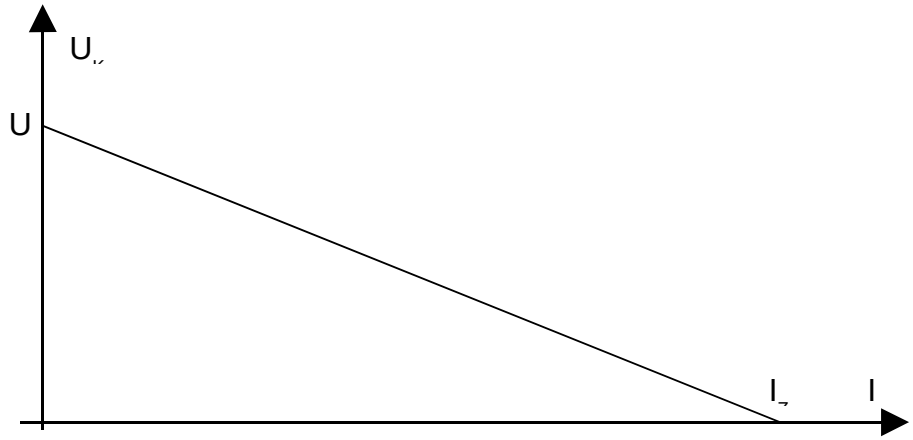
$U_{K1} = I_{T1} \cdot R_{T1} = 20 \cdot 1 = 20V$

b: $I_2 = \frac{U}{R_B + R_{T2}} \Rightarrow R_b + R_{T2} = \frac{U}{I_2} \Rightarrow R_{T2} = \frac{U}{I_2} - R_b = \frac{22}{10} - 0.1 = 2.1\Omega$

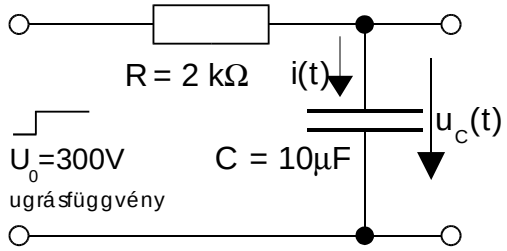
$U_{K2} = I_{T2} \cdot R_{T2} = 10 \cdot 2.1 = 21V$

c: zárlat van akkor, ha $R_T = R_{TZ} = 0$ $I_Z = \frac{U}{R_b + R_{TZ}} = \frac{U}{R_b + 0} = \frac{U}{R_b} = \frac{22}{0.1} = 220A$

d: A Kirchoff huroktörvényből (lásd nyílirány): $U - U_k - I \cdot R_b = 0 \Rightarrow U_k = U - I \cdot R_b$



3



a: az időállandó τ=……s
b: időfüggvény $u_C(t)$=……..
c: ábrázolás: i(t)
d: t_1=10ms
u_{C1}=……V
i_1=……..A

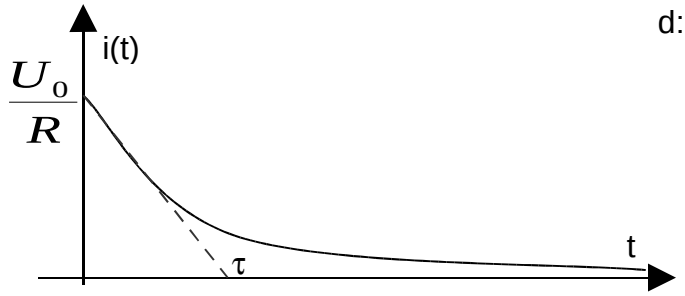
$R = 2k\Omega = 2 \cdot 10^3 \Omega = 2000\Omega$
$C = 10\mu F = 10 \cdot 10^{-6} F = 10^{-5} F$

a: $\tau = R \cdot C = 2000 \cdot 10^{-5} = 2 \cdot 10^{-2} s = 0.02s$

b: ha t<0, akkor $u_C=0$.
Ha 0≤t, akkor $u_C(t) = U_0 - i(t) \cdot R$ (lásd Kirchoff huroktörvény 2. feladat)

$$i(t) = \frac{U_0}{R} \cdot e^{-\frac{t}{\tau}} \Rightarrow \qquad u_C(t) = U_0 - \frac{U_0}{R} \cdot e^{-\frac{t}{\tau}} \cdot R = U_0 - U_0 \cdot e^{-\frac{t}{\tau}} = U_0 \cdot \left(1 - e^{-\frac{t}{\tau}}\right)$$

c:



d: $t_1 = 10ms = 10 \cdot 10^{-3} s = 10^{-2} s$

$$u_{C1} = U_0 \cdot \left(1 - e^{-\frac{t_1}{\tau}}\right) = 300 \cdot \left(1 - e^{\frac{-10^{-2}}{2 \cdot 10^{-2}}}\right) =$$

$$= 300 \cdot \left(1 - e^{\frac{-1}{2}}\right) = 300 \cdot \left(1 - \frac{1}{\sqrt{e}}\right) \approx 118V$$

$$i_1 = \frac{U_0}{R} \cdot e^{-\frac{t_1}{\tau}} = \frac{300}{2000} \cdot e^{\frac{-10^{-2}}{2 \cdot 10^{-2}}} = \frac{3}{20} \cdot \frac{1}{\sqrt{e}} \approx$$

$$\approx 0.09A$$