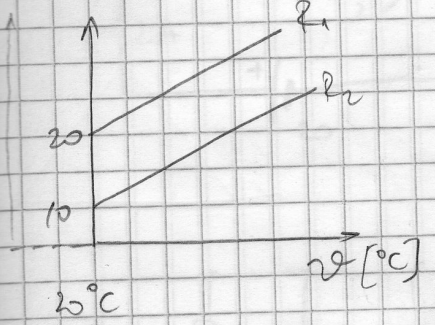
MERENJE

①

R_1 α_1

R_2 α_2



$y = kx + l$ $\quad k = \alpha_1 \cdot$

$R_\vartheta = R_{20}(1 + \alpha(\vartheta - 20))$

$R_\vartheta = R_{20} + R_{20} \alpha \Delta\vartheta$

$= R_{20}[1 + \alpha(\vartheta - 20)]$

$\frac{\alpha_1}{\alpha_2} = ?$

$\alpha_1 \cdot R_{10} = \alpha_2 \cdot R_{20}$

$\frac{\alpha_1}{\alpha_2} = \frac{R_{20}}{R_{10}} = \frac{1}{2}$

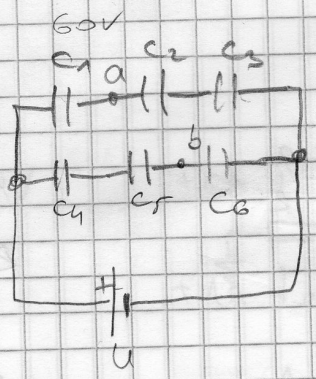
②

$U_{ba} = ?$

$U = 120\,V$

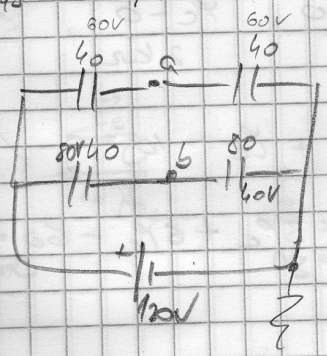
$C_1 = 40\,\mu F$

$C_2 = C_3 = C_4 = C_5 = C_6 = 80\,\mu F$



$C_{23} = 40\,\mu F$

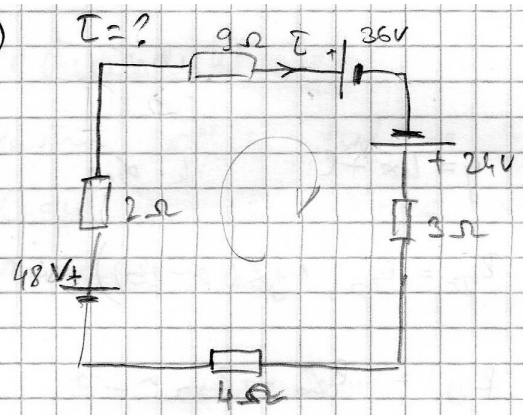
$C_{40} = 40\,\mu F$



$U_{ba} = \varphi_b - \varphi_a$

$U_{ba} = +40 - 60 = -20\,V$

3.

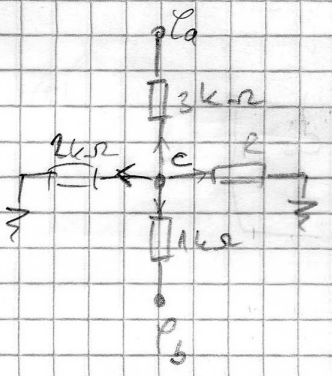


$$-36V + 24V + 48V = I\,(3\Omega + 9\Omega + 2 + 4)$$

$$36V = 18\,I$$

$$I = 2\,A$$

4. $\varphi_c = ?$



$$\varphi_a = 54\,V$$

$$\varphi_b = 10\,V$$

$$R = 2k\Omega$$

$$\Sigma I = 0$$

$$+\frac{\varphi_c - \varphi_a}{3k\Omega} + \frac{\varphi_c - 0}{R} + \frac{\varphi_c - 0}{2k\Omega} + \frac{\varphi_c - \varphi_b}{1k\Omega} = 0$$

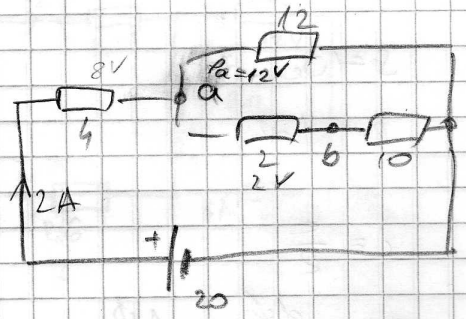
$$\frac{\varphi_c}{3} - 18 + \frac{\varphi_c}{2} + \frac{\varphi_c}{2} + \varphi_c - 10 = 0 \quad /\cdot 6$$

$$2\varphi_c - 108 + 3\varphi_c + 3\varphi_c + 6\varphi_c - 60 = 0$$

$$14\varphi_c = 168$$

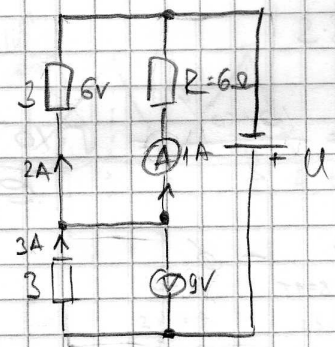
$$\varphi_c = 12\,V$$

(5)



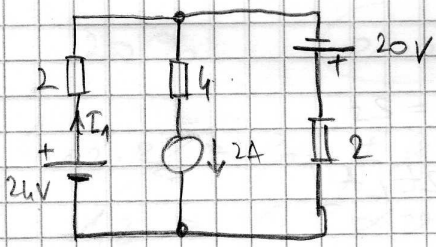
$U_{ab} = ? = 2\,V$

(6)



$P_R = ? = 6\,W$

(7.)



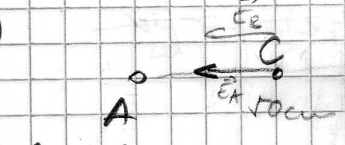
$12\,V$ $+6A \uparrow$

$2A$ $+1A \uparrow$

$20\,V$ $5A \uparrow$

$I_1 = 12\,A$

(8.)



$Q_A = -12\,nC$ $Q_B = 16\,nC$

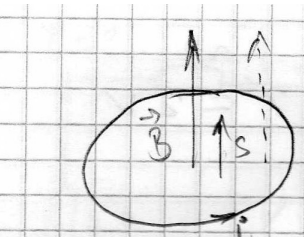
$\vec{E}_C = \vec{E}_A + \vec{E}_B$

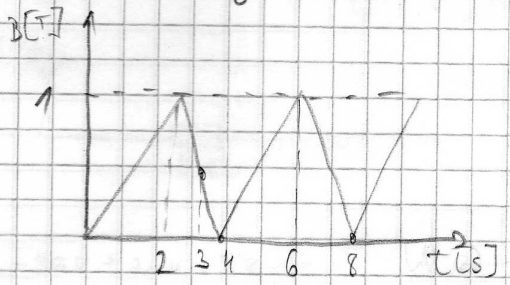
$E_C = \frac{Q_A}{4\pi\varepsilon_0 (\frac{d}{2})^2} + \frac{Q_B}{4\pi\varepsilon_0 (\frac{d}{2})^2}$

$= 1725,646 + 2300,86$

$= 14026,5\ \frac{V}{m}$

9.





$S = 10\,cm^2$

$R = 1\,\Omega$

$i = \frac{e}{R}$

$e = -\frac{d\phi}{dt} = -\frac{\Delta\phi}{\Delta t}$

$\phi = B \cdot S$

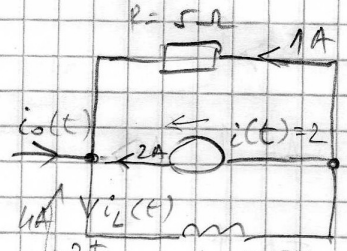
$\left|\frac{\Delta\phi}{\Delta t}\right| = \frac{10 \cdot 10^{-4}}{2} = 5 \cdot 10^{-4}\,A$

e

$\Delta\phi = \phi_{\substack{B=1T \\ t=2s}} - \phi_{\substack{B=0 \\ t=4s}}$

$\Delta\phi = \phi(t=2) - \underbrace{\phi(t=4)}_{0}$

10.



$-7\,A$

$i_0(t) \quad t = 2s$

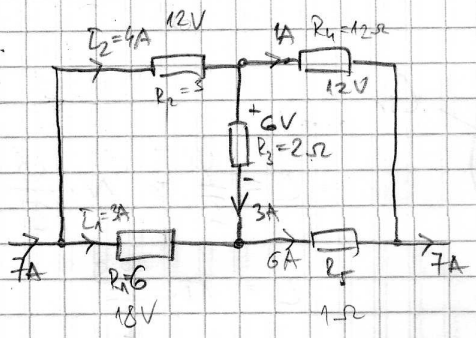
$i_L(t) = -2t\,[A]$

$i_L(t=2s) = -2 \cdot 2 = -4\,A$

$\frac{di}{dt} = -2A$

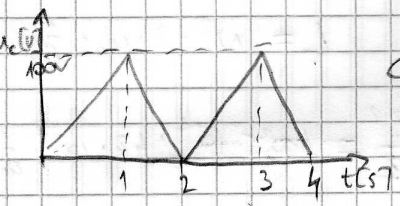
$u_L(t) = L \cdot \frac{di}{dt} = 2{,}5 \cdot (-2) = |-5|\,V$

11.



$P_{R5} = ? = 36W$

12.



$C = 10\mu F$

$W = \frac{C \cdot U^2}{2}$

$i[A] = C \cdot \frac{du}{dt} = 10 \cdot 10^{-6} \cdot 100 = 10^{-3}$

$P = U \cdot I$

$P = U \cdot I = 100 \cdot 10^{-3} = 100\,mW$

13.

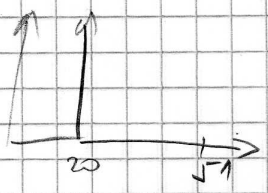
20 %

0,00392 α

$1,2 \cdot R_{20} = R_{20} + R_{20} \cdot \alpha \cdot \vartheta$

$1,2 = 1 + \alpha\vartheta$

$\vartheta = \frac{0,2}{\alpha} = 51$



51 + 20 = 71

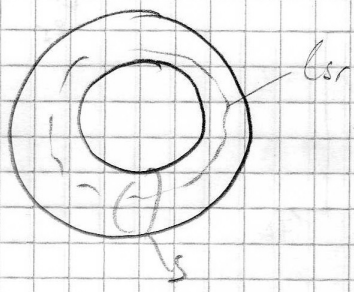
14.

$l_{śr} = 20\,cm$

$S = 1\,cm^2$

$N = 400$

$I = 0{,}5\,A$



$$W = L \cdot \frac{I^2}{2}$$

$$L = \frac{\Psi}{I} = N \cdot \frac{\Phi}{I}$$

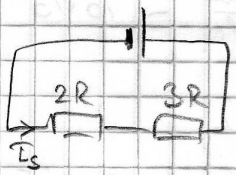
$$L = N \cdot \frac{BS}{I}$$

$$L = \frac{N}{I} \cdot S \cdot \mu_0 \frac{NI}{l}$$

$$L = N^2 \cdot S \cdot \mu_0 \cdot \frac{1}{l}$$

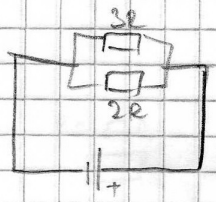
$$W = N^2 \cdot S \cdot \mu_0 \cdot \frac{1}{l} \cdot \frac{I^2}{2} = 400^2 \cdot 10^{-4} \cdot 4\pi \cdot 10^{-7} \cdot \frac{1}{0{,}2} \cdot \frac{0{,}5^2}{2}$$

15.



P_S

$$I_S = \frac{U}{5R} \qquad P_S = U \cdot \frac{U}{5R} = \frac{U^2}{5R}$$



P_P

$$I_P = \frac{U}{1{,}2R} \qquad P_P = U \cdot \frac{U}{1{,}2R} = \frac{U^2}{1{,}2R}$$

$\frac{P_S}{P_P}$

$$\frac{P_S}{P_P} = \frac{\frac{U^2}{5R}}{\frac{U^2}{1{,}2R}} = \frac{1{,}2R}{5R} = 0{,}24$$