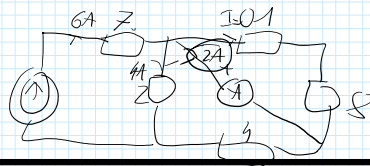


Zad.1

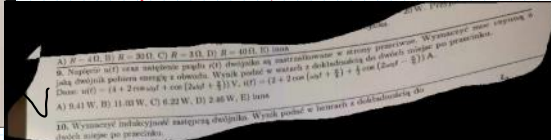
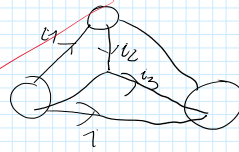


Zad.2

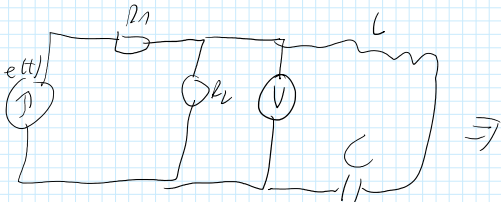
$$i_1(t) = \cos(\omega t + \frac{\pi}{2}) \text{ A}$$

$$i_2(t) = \cos(\omega t + \frac{\pi}{2}) \text{ A}$$

$$i_3(t) = \cos(\omega t - \frac{\pi}{4}) \text{ A}$$



Zad.3



$$e(t) = 110 \cos(700t - \frac{\pi}{2})$$

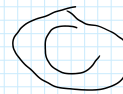
$$R_1 = 30\Omega, R_2 = 20\Omega, L = 10\text{mH}$$

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$$\omega L = \frac{1}{\omega C}$$

$$100 \cdot 0,0001 = \frac{1}{C}$$

$$C = \frac{1}{400} = 2,5\text{mF}$$

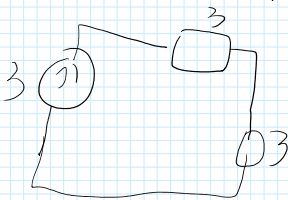
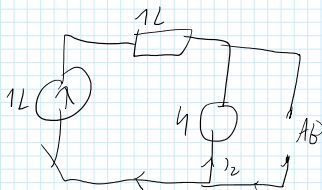


Zad.4

$$E_0 = 12\text{V}$$

$$R_1 = 1\Omega$$

$$R_2 = 4\Omega$$



$$I = \frac{3}{6}$$

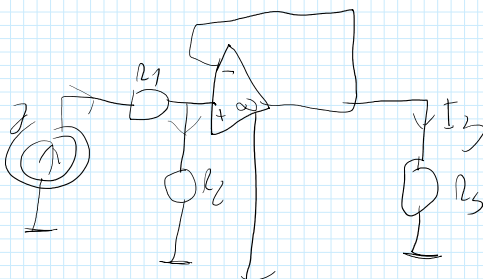
$$R_{TH} = \frac{12 \cdot 4}{12 + 4} = 3$$

$$V(\frac{1}{12} + \frac{3}{12}) = \frac{12}{12}$$

$$V = \frac{12}{12} \cdot \frac{12}{4} = 3$$

$$P = 0,5^2 \cdot 3 = 0,75\text{W}$$

Zad.5



$$-2R_2 + I_3 R_3 = 0$$

$$2R_2 = I_3 R_3$$

$$45 = 9I_3$$

$$I_3 = 5\text{A}$$

Zad. 6

$$e(t) = E_m \cos(\omega t + \varphi) \quad e(t) = 12 \cos(1000t + \frac{\pi}{4})$$

$$R_1 = 300 \Omega$$

$$R_2 = 100 \Omega$$

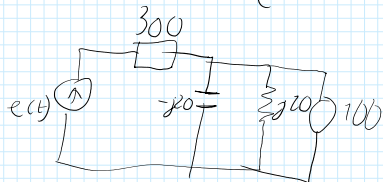
$$L = 20 \text{ mH} = 20 \cdot 10^{-3}$$

$$C = 50 \cdot 10^{-6} \text{ F}$$

$$\omega = 1000 \text{ rad/s}$$

$$E_m = 12 \text{ V}$$

$$\varphi = 45^\circ$$



$$X_L = 0, 02 \cdot 1000 = 20 \quad \left. \begin{array}{l} X_C = \frac{1}{50 \cdot 10^{-6} \cdot 1000} = 20 \end{array} \right\} \text{resonance}$$

$$\omega = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{20 \cdot 10^{-3} \cdot 50 \cdot 10^{-6}}} = 1000 \text{ rad/s}$$

$$E = 12 (\cos 45^\circ + j \sin 45^\circ) = 12 \left( \frac{\sqrt{2}}{2} + j \frac{\sqrt{2}}{2} \right) = 6\sqrt{2} + 6\sqrt{2}j$$

$$U = E \cdot \frac{100}{100+300} = (6\sqrt{2} + 6\sqrt{2}j) \cdot \frac{1}{4} = \frac{3}{2}\sqrt{2} + \frac{3}{2}\sqrt{2}j$$

$$I = \frac{U}{-jX_C} = \frac{\frac{3}{2}\sqrt{2} + \frac{3}{2}\sqrt{2}j}{-j20} = -\frac{3\sqrt{2}}{40} + \frac{3\sqrt{2}}{40}j = -0,106 + 0,106j$$

$$|I| = \sqrt{0,106^2 + 0,106^2} = 0,150 = 150 \text{ mA}$$

$$i(t) = 150 \cos(\omega t + \frac{\pi}{4})$$

Zad. 7

$$P_{max} = 90 \text{ W}$$

$$P_{min} = -10 \text{ W}$$

$$U_{SL} = 50 \text{ V}$$

$$1) P = \frac{90 - 10}{2} = 40$$

$$S = \sqrt{Q^2 + P^2}$$

$$Q = \sqrt{S^2 - P^2} =$$

$$= \sqrt{50^2 - 40^2} = 30$$

$$1) S = \frac{90+10}{2} = 50 \quad S = \frac{U_{SL}^2}{|Z_L|}$$

$$\frac{U_{SL}^2}{R} = 40 \quad \vee \quad \frac{U^2}{X_L} = 30 \quad |Z_L| = 50$$

$$\frac{\frac{U^2}{R}}{\frac{U^2}{X_L}} = \frac{40}{30} \Rightarrow \frac{X_L}{R} = \frac{4}{3}$$

$$X_L = \frac{4}{3} R$$

$$3) |Z_L| = \sqrt{X_L^2 + R^2}$$

$$50 = \sqrt{\left(\frac{4}{3}R\right)^2 + R^2}$$

$$50 = \sqrt{\frac{25}{9}R^2}$$

$$\frac{5}{3}R = 50$$

$$R = 30 \Omega$$

(A)

Zad. 9

$$u(t) = (4 + 2 \cos \omega_0 t + \cos(2\omega_0 t + \frac{\pi}{3})) \text{ V}$$

$$i(t) = (2 + 1 \cos(\omega_0 t + \frac{\pi}{4}) + \frac{1}{2} \cos(2\omega_0 t - \frac{\pi}{6})) \text{ A}$$

$$P = \underline{U} \cdot \underline{I} \cdot \cos \varphi$$

$$P = 4 \cdot 2 + 2 \cdot 2 \cdot \frac{1}{2} \cdot \cos(0 + \frac{\pi}{4}) + \frac{1}{2} \cdot \frac{1}{2} \cdot \cos(330^\circ - 60^\circ) =$$

$$= 8 + 2 + 0,25 = 10,25 \text{ W}$$

$$p = 7 \cdot 2 + 2 \cdot 2 \cdot 2 \cdot \cos(10^\circ) + 2 \cdot 2 \cdot \cos(30^\circ) = 8 + 2 \cos \frac{\pi}{9} = 9,41 \quad (4)$$