1-masala (RL-zanjir)

$$\tau = L/R$$
$$\tau = 0{,}40/5 = 0{,}08\,s$$

$$I_0 = \varepsilon/R$$
$$I_0 = 20/5 = 4\,A$$

$$I(t) = I_0 \cdot (1 - e^{-t}/\tau)$$

$$t/\tau = 0{,}20/0{,}08 = 2{,}5$$
$$e^{-2\,\cdot\,5} \approx 0{,}082$$

$$I = 4 \cdot (1 - 0{,}082) = 3{,}67\,A$$

$$W = L \cdot I^2/2$$
$$W = 0{,}40 \cdot (3{,}67)^2/2 \approx 2{,}7\,J$$

2-masala (RL — uzish)

$$\tau = L/R$$
$$\tau = 0{,}30/6 = 0{,}05\,s$$

$$I(t) = I_0 \cdot e^{-t}/\tau$$

$$t/\tau = 0{,}10/0{,}05 = 2$$
$$e^{-2} \approx 0{,}135$$

$$I = 3 \cdot 0{,}135 = 0{,}41\,A$$

$$P = I^2 \cdot R$$
$$P = (0{,}41)^2 \cdot 6 \approx 1{,}0\,W$$

3-masala (RC — zaryadlanish)

$$\tau = R \cdot C$$
$$\tau = 4000 \cdot 0{,}00025 = 1\,s$$

$$I_0 = \varepsilon/R$$
$$I_0 = 16/4000 = 0{,}004\,A = 4\,mA$$

$$U_{?}(t) = \varepsilon \cdot (1 - e^{-t}/\tau)$$

$$t = 2\tau \rightarrow e^{-2} \approx 0{,}135$$

$$U = 16 \cdot (1 - 0{,}135) = 13{,}8\,V$$

$$W = C \cdot U^2/2$$
$$W = 0{,}00025 \cdot (13{,}8)^2/2 \approx 0{,}024\,J$$

4-masala (RC — razryadlanish)

$$\tau = R \cdot C$$
$$\tau = 2000 \cdot 0{,}0001 = 0{,}20\,s$$

$$U_C(t) = U_0 \cdot e^{-t}/\tau$$

$$t/\tau = 0{,}50/0{,}20 = 2{,}5$$
$$e^{-2 \cdot 5} \approx 0{,}082$$

$$U \approx 12 \cdot 0{,}082 \approx 0{,}98\,V$$

$$I = U/R$$
$$I \approx 0{,}98/2000 = 0{,}49\,mA$$

$$W = C \cdot U^2/2$$
$$W \approx 0{,}0001 \cdot (0{,}98)^2/2 \approx 4{,}8 \cdot 10^{-5}\,J$$

5-masala (RL va RC)

RL-zanjir:

$$\tau_1 = L/R = 0{,}50/10 = 0{,}05\,s$$

RC-zanjir:

$$\tau_2 = R \cdot C = 10 \cdot 0{,}050 = 0{,}50\,s$$

Tezroq jarayon — τ kichik bo‘lgan → RL

τ teng bo‘lishi uchun:

$$\tau = R \cdot C$$

$$C = 0{,}05/10 = 0{,}005\,F$$

6-masala (o‘zgaruvchan tok)

$$U^{ok} = U_0/\sqrt{2}$$
$$U^{ok} \approx 310/1{,}41 \approx 220\,V$$

$$I^{ok} = I_0/\sqrt{2}$$

$$I^{ok} \approx 10/1{,}41 \approx 7{,}1\,A$$

$$cos\varphi = cos60° = 0{,}5$$

$$P = U^{ok} \cdot I^{ok} \cdot cos\varphi$$
$$P \approx 220 \cdot 7{,}1 \cdot 0{,}5 \approx 780\,W$$

7-masala (AC + energiya)

$$R = U/I$$
$$R = 220/5 = 44\,\Omega$$

$$P = U \cdot I$$
$$P = 220 \cdot 5 = 1100\,W$$

$$A = P \cdot t$$
$$A = 1100 \cdot 600 = 6{,}6 \cdot 10^5\,J$$

8-masala (transformator)

$$U_2 = U_1 \cdot N_2/N_1$$
$$U_2 = 220 \cdot 200/800 = 55\,V$$

$$I_1 = U_2 \cdot I_2/U_1$$
$$I_1 = 55 \cdot 4/220 = 1\,A$$

$$P = U_2 \cdot I_2 = 220\,W$$

9-masala (FOIK)

$$P_2 = \eta \cdot P_1$$
$$P_2 = 0{,}90 \cdot 1100 = 990\,W$$

$$I_2 = P_2/U_2$$
$$I_2 = 990/110 = 9\,A$$

10-masala (energiya)

$$W = L \cdot I^2/2$$
$$W = 0{,}20 \cdot 25/2 = 2{,}5\,J$$

Boshlang‘ich maksimal tok = 5 A

$$W = Wc$$
$$L \cdot I^2 = C \cdot U^2$$

$$C = (0{,}20 \cdot 25)/100 = 0{,}05\,F$$