

$$① (12 \parallel 9,7) + 3,3 = 4,256 \text{ k}\Omega$$

$$I' = \frac{4256 \text{ k}\Omega \cdot 5 \text{ mA}}{2,2 \text{ k}\Omega + 4256 \text{ k}\Omega} = 3,3 \text{ mA}$$

$$(2,2 + 3,3) \parallel 5,5 = 2,53 \text{ k}\Omega$$

$$R_T = 2,54 \cdot 1,2 = 3,73$$

$$I_S = \frac{8}{3,73} = 2,14 \text{ mA}$$

$$I'' = \frac{4,7 \cdot 2,14}{4,7 + 5,5} = 0,986 \text{ mA}$$

$$I = I' + I'' = 4,286 \text{ mA}$$

$$② T_1 = \frac{E_1}{R_T} = \frac{12}{6 + 5,88} = 1,03$$

$$I' = \frac{30}{30 + 7} = \frac{30 \cdot 1,03}{37} = 835,14$$

$$V_x = I' \cdot 4 \text{ k}\Omega = 3,34 \text{ V}$$

$$I' = \frac{8 \cdot 6 \text{ A}}{8 + 4} = 4 \text{ A}$$

$$V_x = I'' \cdot 4 = 16 \text{ V}$$

$$R_T = 12 \parallel (4 + 5) = 5,54$$

$$I' = \frac{E_1}{R_T} = \frac{8V}{4 + 5,54} = 0,875$$

$$I'' = \frac{E_2}{R_T} \approx \frac{12 I'}{12 + 9} = 0,54$$

$$V''_5 = I'' \cdot 4 = 2V$$

$$V_X = V_5^* - V_X^1 - V_X^* = 16 - 3,34 - 2 = 10,66V$$

$$\textcircled{2} \quad E = -4,68 = -27,2V$$

$$R_T = 6,8 + 1,5 = 8,34 \Omega$$

$$V_F = -27,2 = 10V$$

$$Z = RC = 8,34 \cdot 2,2 = 18,26$$

$$V_C = V_F (V_C - V_F) C$$

$$V_C = -27,2 + 37,2 e^{-t/18,26}$$

$$V_C(0^+) = -37,2V$$

$$I_C = -\frac{37,2}{8,34} e^{-t/18,26}$$

$$I_L = \frac{8}{1,5} = 5,33 \text{ mA}$$

$$R_{TH} = (3 \parallel 12) \parallel 4 = 1,5$$

$$E_{TH} = \frac{24 \cdot 20}{24 + 4} = 7,5$$

$$R'_{TH} = 1,5 \parallel 1,5 = 0,75 \text{ k}\Omega$$

$$E'_{TH} = 8 \text{ V} + 7,5 \text{ V} = 15,5 \text{ V}$$

$$\tau = \frac{L}{R} = \frac{3 \text{ mH}}{0,75 \text{ k}\Omega} = 4 \text{ }\mu\text{s}$$

$$I_f = \frac{15,5}{0,75} = 20,67 \quad I_s = 5,33 \text{ mA}$$

$$I_L = I_f + (I_s - I_f)e^{-t/\tau}$$

$$I_L = (20,67 - 15,34 e^{-t/4}) \text{ mA}$$

$$V_L = 15,5 \text{ V} e^{-t/\tau}$$

$$\textcircled{b} \quad I_L(2\tau) = 20,67 - 15,34 e^{-2}$$

$$I_L = 18,6 \text{ mA}$$

$$V_L(0) = 15,5 V e^{-t/\tau} = 2,09 V$$

$$I = 18,6 \text{ mA}$$

$$V_L + V_S - 8 \text{ V} = 0$$

$$V_L = 8 - V_r = 8 - (18,6)(1,5)$$

$$V_L = -19,9 \text{ V}$$

$$\tau = \frac{L}{R} = \frac{3}{15 \text{ k}\Omega} = 2 \mu\text{s}$$

$$I_t = 18,6$$

$$I_f = \frac{8 \text{ V}}{1,5 \text{ k}\Omega} = 5,33 \text{ mA}$$

$$I_L = I_f + (I_t - I_f) e^{-t/\tau}$$

$$I_L = 5,33 + (18,6 - 5,33) e^{-t/\tau}$$

$$V_L = -19,9 e^{-t/\tau}$$

