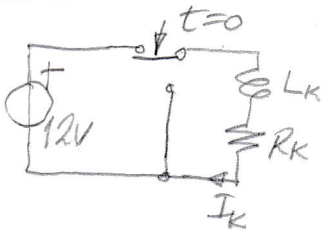


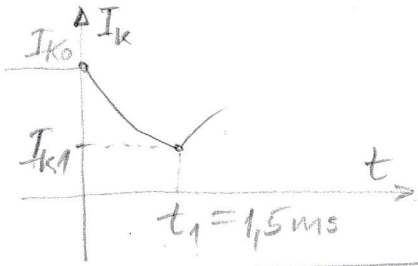
①



$$I_{k0} = \frac{12V}{R_k} = \frac{12V}{100} = 120 \text{ mA}$$

$$I_{k1} = I_{k0} \cdot e^{-\frac{t_1}{\tau}} = 120 \cdot 10^{-3} \cdot e^{-\frac{1,5}{2}} = 56,7 \text{ mA}$$

$$t_1 = 1,5 \text{ ms}; \quad \tau = L_k / R_k = 2 \text{ ms};$$



②

a)  $I_{D2} = I_{D3} > 0 ? \Rightarrow U_{R2} + U_{D1} = U_{D2} + U_{D3} \Rightarrow U_{R2} = U_D = 0,6 \text{ V};$

$$I_{R2} = \frac{U_D}{100} = \frac{0,6}{100} = 6 \text{ mA}$$

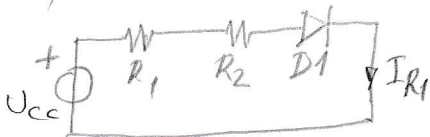
$$U_{R1} = U_{CC} - (U_{D2} + U_{D3}) = 5 - 1,2 = 3,8 \text{ V}$$

$$I_{R1} = \frac{U_{R1}}{R_1} = \frac{3,8}{1000} = 3,8 \text{ mA} < I_{R2} \Rightarrow I_{D2} = I_{D3} = 0.$$

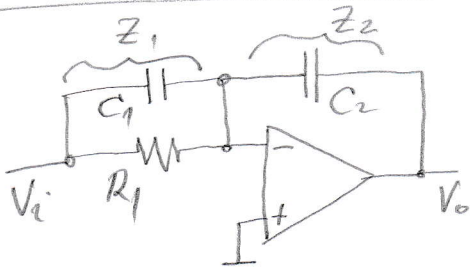
b)  $I_{D2} = I_{D3} = 0 ? \Rightarrow$

$$I_{R1} = \frac{U_{CC} - U_{D1}}{R_1 + R_2} = \frac{5 - 0,6}{1000 + 100} = 4 \text{ mA}$$

$$I_{CC} = I_{D1} = I_{R1} = 4 \text{ mA}$$



③



$$A(j\omega) = -\frac{Z_2}{Z_1}$$

$$Z_1 = \left( \frac{1}{R_1} + j\omega C_1 \right)^{-1}$$

$$Z_2 = \frac{1}{j\omega C_2}$$

$$A(j\omega) = -\frac{\frac{1}{R_1} + j\omega C_1}{j\omega C_2} = -\frac{1 + j\omega C_1 R_1}{j\omega C_2 R_1} = -\left( \frac{1/C_2 R_1}{j\omega} \right) \cdot \left( 1 + \frac{j\omega}{1/C_1 R_1} \right);$$

$$A(\infty) = \frac{C_1}{C_2} = \frac{10 \cdot 10^{-9}}{1 \cdot 10^{-9}} = 10;$$

$$P = 0$$

$$\omega_z = \frac{1}{C_1 R_1} = \frac{1}{10 \cdot 10^{-9} \cdot 10^4} = 10^4 = 10 \text{ krad/s}; \quad f_z = \frac{\omega_z}{2\pi} = 1,59 \text{ kHz}$$

$$\omega_0 = \frac{1}{R_1 C_2} = \frac{1}{10^4 \cdot 10^{-9}} = 10^5; \quad f_0 = 15,9 \text{ kHz}$$

