

REŠENJA

1. a) Kolo se sastoji od dva neinvertujuća pojačavača i jednog sabirača:

$$\left. \begin{aligned} \text{inv1: } v_1 &= -1V \cdot \left(1 + \frac{R_f}{1k\Omega}\right) = -1V \cdot \left(2 + 0.01 \frac{t}{^\circ\text{C}}\right) \\ \text{inv2: } v_2 &= 1V \cdot \left(1 + \frac{1k\Omega}{1k\Omega}\right) = 2V \end{aligned} \right\} \text{sabirac: } v_{izl} = -2v_1 - 2v_2 = -2(v_1 + v_2) = 0.02 \frac{t}{^\circ\text{C}} [\text{V}]$$

$$v_{izl} = 0.4V = 0.02 \frac{t}{^\circ\text{C}} \cdot V \Rightarrow t = \frac{0.4}{0.02} ^\circ\text{C} = 20^\circ\text{C}$$

b)

$$v_{izl} = a_1 \cdot v_1 + a_2 \cdot v_2 = a_d \cdot v_d + a_s \cdot v_s = -2 \cdot v_1 - \frac{6k\Omega}{R_0} \cdot v_2 \Rightarrow \boxed{a_1 = -2}$$

$$a_1 \cdot v_1 + a_2 \cdot v_2 = a_d \cdot (v_1 - v_2) + a_s \cdot \left(\frac{v_1 + v_2}{2}\right) = \left(a_d + \frac{a_s}{2}\right) \cdot v_1 + \left(-a_d + \frac{a_s}{2}\right) \cdot v_2$$

$$a_s = a_1 + a_2 \Rightarrow -2 + a_2 = -5 \Rightarrow \boxed{a_2 = -3} \Rightarrow \boxed{R_0 = 2k\Omega}$$

$$\boxed{a_d = \frac{a_1 - a_2}{2} = 1/2}$$

2. b)

$$\left. \begin{aligned} a_{dDC} &= \left(1 + 2 \frac{R}{\infty}\right) \left(\frac{R}{R}\right) = 1 \\ a_{dAC} &= \left(1 + 2 \frac{R}{R_0}\right) \left(\frac{R}{R}\right) = 2 \end{aligned} \right\} v_{izl} = v_D(t) = 10\text{mV} + 20\text{mV} \cos \omega t$$

3. a)  $Z_p = 10\Omega + j5\Omega$

b)  $Z_p = 10\Omega + j5\Omega = R + jX$

Prvi način:

$$\underline{S} = P + jQ = VI \cos \phi + jVI \sin \phi = S \cos \phi + jS \sin \phi, P / S = \cos \phi$$

$$P = R \cdot I^2, Q = X \cdot I^2, S = |\underline{S}| = \sqrt{P^2 + Q^2} = I^2 \sqrt{R^2 + X^2}$$

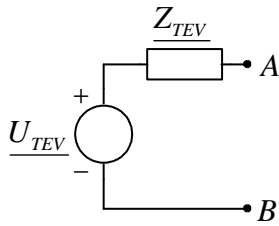
$$\cos \phi = \frac{R}{\sqrt{R^2 + X^2}} = \frac{10}{\sqrt{100 + 25}} \approx 0.89$$

Drugi način:

$$\underline{S} = \underline{U} \cdot \underline{I}^* = (Z_p \cdot \underline{I}) \underline{I}^* = Z_p \cdot (\underline{I} \cdot \underline{I}^*) = Z_p \cdot I^2 = (Z_p \cdot e^{j\phi}) \cdot I^2$$

$$\phi = \arctg\left(\frac{X}{R}\right) = \arctg\left(\frac{1}{2}\right) \approx 26.5^\circ \Rightarrow \cos \phi \approx 0.89$$

4. a)  $\underline{U}_{TEV} = -j4V$ ,  $\underline{Z}_{TEV} = 2\Omega$



b)  $\underline{S} = 1,656 + j1,104$        $P = 1,656W$        $Q = 1,104VAr$        $S = 1,99VA$

$i_p(t) = 1,051A \cos(2\pi ft + 248,2^\circ)$

5.

Za  $-10V \leq v_G \leq 0,7V$ :  $D - OFF$ ,  $DZ - OFF$ ,  $v_I = 0 = const.$

Za  $0,7V \leq v_G \leq 7,367V$ :  $D - ON$ ,  $DZ - OFF$ ,  $v_I[V] = 0,75v_G[V] - 0,525$

Za  $7,367V \leq v_G \leq 10V$ :  $D - ON$ ,  $DZ - proboj$ ,  $v_I = 5V = const.$

