

REŠENJA ZADATAKA

2. a) $v_i[V] = 3,333 \cdot i_G[\text{mA}] + 2,733$

b) $v_i[V] = 20 \cdot i_G[\text{mA}]$

3.

3)

a) $I_{R1} = \frac{V_{CC} - V_{BE} + V_{EE}}{R_1} = \frac{23.4V}{R_1}$
 $I_{R1} = I_{C1} (1 + \frac{\beta}{\beta_F}) = 1.03 \text{ mA}$
 $R_1 = \frac{23.4V}{1.03 \text{ mA}} = 22.7 \text{ k}\Omega = R_1$

b) $V_{CC} - R_D I_D = 5.5V \quad I_D = I_{C3} = 1 \text{ mA}$
 $R_D I_D = 6.5V \Rightarrow R_D = 6.5 \text{ k}\Omega$

c) $g_{m4} = \frac{I_{C4}}{V_T} \approx \frac{1 \text{ mA}}{25 \text{ mV}} = 0.04 \text{ S} \quad V_{\pi 4} = \frac{\beta_0}{g_{m4}} = 2 \text{ k}\Omega$
 $g_{m5} = \sqrt{2\beta I_{D5}} = 1.41 \text{ mS}$
 $a = \left(\frac{g_{m4} R_E}{1 + g_{m4} R_E} \right) \cdot \left(- \frac{g_{m5} R_D}{\beta_S} \right) =$
 $= -\frac{2}{3} \cdot 9.17 = -6.11 = a \quad (5) \text{ } \infty \text{ B}\Omega$
 $V_u = V_{\pi 4} + (1 + \beta_0) R_E \approx 7 \text{ k}\Omega \quad (3) \text{ } \infty \text{ B}\Omega$
 $V_i = R_D = 6 \text{ k}\Omega \quad (2) \text{ } \infty \text{ B}\Omega$

d) $v_i = v_g \cdot \left(\frac{V_u}{V_u + V_g} \right) \cdot \frac{R_p}{R_p + V_i} \cdot a$
 $v_i = v_g \cdot (-6.11) \cdot \frac{7 \text{ k}\Omega}{8 \text{ k}\Omega} \cdot \frac{3 \text{ k}\Omega}{9 \text{ k}\Omega} = -1.7 \text{ mV}$
 $v_i = -1.7 \text{ mV} \cos \omega t$

e) $I_{C4} = \frac{I_{C2}}{1 + \beta_F} \approx 10 \mu\text{A}$
 $i_g = \frac{v_g}{V_g + V_u} = \frac{v_g}{8 \text{ k}\Omega} = 0.118 \mu\text{A} \cos \omega t$
 $i_G = I_{C4} + i_g$

4. a) $I_1 = 4 \text{ mA}, I_3 = 8 \text{ mA}, I_5 = 10 \text{ mA}, I_6 = 10 \text{ mA}$

b) $R_{X \text{ max}} = 1,6 \text{ k}\Omega$