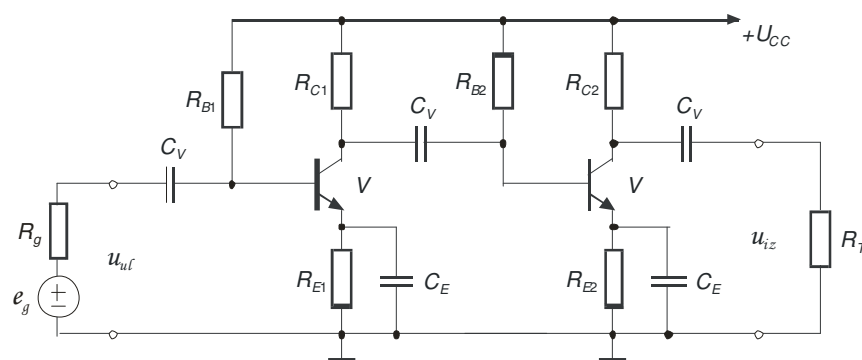


3. domaća zadaća iz Analognih sklopova i Elektroničkih sklopova

1. U pojačalu sa slike zadano je: $U_{CC} = 24 \text{ V}$, $R_{B1} = 1 \text{ M}\Omega$, $R_{C1} = 3,9 \text{ k}\Omega$, $R_{E1} = 390 \Omega$, $\beta_1 = h_{fe1} = 150$, $R_{B2} = 6,8 \text{ k}\Omega$, $R_{C2} = 100 \Omega$, $R_{E2} = 12 \Omega$, $\beta_2 = h_{fe2} = 40$, $R_T = 1 \text{ k}\Omega$, $R_g = 600 \Omega$. Izračunajte statičke radne točke obaju tranzistora, ulazni otpor pojačala R_{ul} te njegovo naponsko pojačanje A_V .



Rješenje:

$$I_{BQ1} = \frac{U_{CC} - U_{BEQ1}}{R_{B1} + (1 + \beta_1)R_{E1}} = 22,00 \mu\text{A}$$

$$I_{CQ1} = \beta_1 I_{BQ1} = 3,301 \text{ mA}$$

$$U_{CEQ1} = U_{CC} - (R_{C1} + R_{E1}) \cdot I_{CQ1} = 9,840 \text{ V}$$

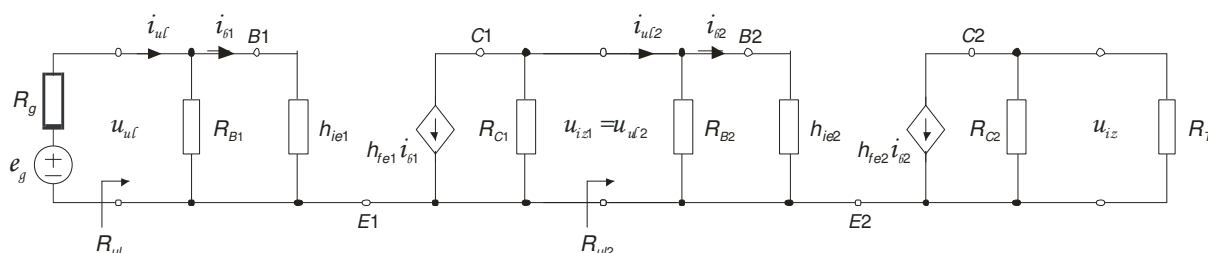
$$I_{BQ2} = \frac{U_{CC} - U_{BEQ2}}{R_{B2} + (1 + \beta_2)R_{E2}} = 3,195 \text{ mA}$$

$$I_{CQ2} = \beta_2 I_{BQ2} = 127,8 \text{ mA}$$

$$U_{CEQ2} = U_{CC} - (R_{C2} + R_{E2}) \cdot I_{CQ2} = 9,685 \text{ V}$$

$$h_{ie1} = \frac{mU_T}{I_{BQ1}} \approx \frac{0,025}{I_{BQ1}} = 1,136 \text{ k}\Omega$$

$$h_{ie2} = \frac{mU_T}{I_{BQ2}} \approx \frac{0,025}{I_{BQ2}} = 7,824 \Omega$$



$$R_{ul} = \frac{\dot{U}_{ul}}{\dot{I}_{ul}} = \dots = \frac{u_{ul}}{i_{ul}} = \frac{i_{ul} \cdot R_{B1} \parallel h_{ie1}}{i_{ul}} = R_{B1} \parallel h_{ie1} = 1,135 \text{ k}\Omega$$

$$A_V = \frac{\dot{U}_{iz}}{\dot{U}_{ul}} = \dots = \frac{u_{iz}}{u_{ul}} = \frac{u_{iz1}}{u_{ul}} \cdot \frac{u_{iz}}{u_{ul2}} = -\frac{i_{b1} \cdot h_{fe1} \cdot R_{C1} \parallel R_{ul2}}{i_{b1} \cdot h_{ie1}} \cdot \left(-\frac{i_{b2} \cdot h_{fe2} \cdot R_{C2} \parallel R_T}{i_{b2} \cdot h_{ie2}} \right)$$

$$A_V = \frac{h_{fe1} \cdot h_{fe2} \cdot R_{C1} \parallel R_{B2} \parallel h_{ie2} \cdot R_{C2} \parallel R_T}{h_{ie1} \cdot h_{ie2}} = 478,6$$