



$$\begin{aligned}
 U_{BE01} &= 0,16V & U_{BE02} &= 0,7V \\
 i_{C01} &= 0,3\mu A & i_{C02} &= 0,4\mu A \\
 R_V &= 470k & U_{C02} &= \frac{1}{2} U_T \\
 h_{11e} &= 33k; \beta = h_{21e} = 120; h_{22e} = 20\mu S \\
 U_T &= 15V & R_L &= 10k \\
 U_g &= 1\mu V & R_g &= 12k
 \end{aligned}$$

$$a.) R_{C2} = \frac{U_T}{2 \cdot i_{C02}} = \frac{15V}{2 \cdot 0,4\mu A} = \underline{\underline{18,75 k\Omega}}$$

$$i_{B02} = \frac{i_{C02}}{h_{21e}} = \frac{0,4\mu A}{120} \approx 3,3\mu A$$

$$i_{B01} = \frac{i_{C01} - i_{B02}}{h_{21e}} \approx \frac{i_{C01}}{h_{21e}} = \frac{0,3\mu A}{120} = 2,5\mu A$$

$$U_{E02} = i_{B01} \cdot R_V + U_{CE01} = 2,5\mu A \cdot 470k + 0,16V = 1,1775V$$

$$R_{E2} = \frac{U_{E02}}{i_{C02} + i_{B01}} \approx \frac{U_{E02}}{i_{C02}} = \frac{1,1775V}{0,4\mu A} = \underline{\underline{4,43 k\Omega}}$$

$$U_{C01} = U_{BE02} + U_{E02} = 0,7V + 1,1775V = 2,4775V$$

$$R_{C1} = \frac{U_T - U_{C01}}{i_{C01}} = \frac{15V - 2,4775V}{0,3\mu A} \approx \underline{\underline{41,8 k\Omega}}$$

$$b.) A_{u1} = -\frac{h_{21e}}{h_{11e}} \left(\frac{1}{h_{22e}} \times R_{C1} \times R_{be2} \right) = -\frac{120}{33k} (50k \times 41,8k \times 33k)$$

$$A_{u1} \approx -\frac{120}{33k} \cdot 13,47k\Omega \approx \underline{\underline{-49,0}}$$

$$A_{u2} = -\frac{h_{21e}}{h_{11e}} \left(\frac{1}{h_{22e}} \times R_{C2} \times R_L \right) = -\frac{120}{33k} (50 \times 18,7k \times 10k)$$

$$A_{u2} = -\frac{120}{33k} \cdot 5,75k\Omega \approx \underline{\underline{-20,9}}$$

$$A_u = A_{u1} \cdot A_{u2} = -49,0 \cdot (-20,9) \approx \underline{\underline{1.024}}$$

$$c.) R_{be1} = R_V \times h_{11e} \approx h_{11e} = 33k\Omega$$

$$U_{be} = \frac{R_{be1}}{R_g + R_{be1}} \cdot U_g = \frac{33k}{10k + 33k} \cdot 1\mu V \approx 0,77\mu V$$

$$u_{ki} = A_u \cdot u_{be} = 0,777_{\mu V} \cdot 1024 \approx \underline{\underline{788 \mu V}}$$

$$d.) \quad f_{e1} = \frac{1}{2\pi \cdot C_1 (R_f + r_{be1})} = \frac{1}{2\pi \cdot 220 \cdot 10^{-9} \cdot (12+33) \cdot 10^3 \Omega} \approx \underline{\underline{16 \text{ Hz}}}$$

$$r_{e2} = \frac{1}{h_{22e}} \times R_{e2} = 50 \text{ k} \times 18,7 \mu \approx 13,6 \text{ k}\Omega$$

$$f_{e2} = \frac{1}{2\pi \cdot C_2 (r_{e2} + R_f)} = \frac{1}{2\pi \cdot 220 \cdot 10^{-9} (13,6+10) \cdot 10^3 \Omega} \approx 31 \text{ Hz}$$

$$f_H = \max(f_{e1}, f_{e2}) = f_{e2} = 31 \text{ Hz}$$

