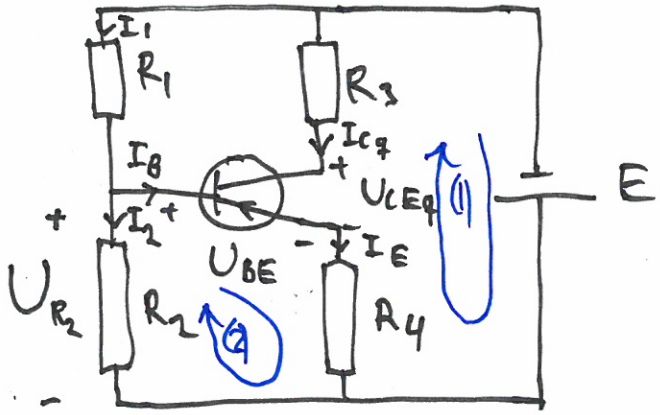
E-4) Likstrømsschema:



$I_{cq} = -3.0\,mA$

$U_{CEq} = -5.0\,A$

$R_1 = 18\,k\Omega$

$R_4 = 1.6\,k\Omega$

$E = 12\,V$

Ur data blad $\Rightarrow$ $h_{FE} = 140$, $U_{BE} = -0.65\,V$

(1) $E + I_E \cdot R_4 + U_{CEq} + I_{cq} \cdot R_3 = 0$

(2) $-I_E \cdot R_4 + U_{R_2} - U_{BE} = 0$

(3) $I_E = I_c + I_B$

(4) $I_B = I_c / h_{FE}$

(4) $\Rightarrow$ $I_B = \frac{-3.0}{140} \approx -21\,\mu A$

(3) $\Rightarrow$ $I_E = -3m - 21\mu \approx -3\,mA \; (\approx I_{cq})$

(1) $\Rightarrow$ $R_3 = \frac{-E - U_{CE} - I_E \cdot R_4}{I_{cq}} = \frac{-12+5-3m \cdot 1.6k}{-3m} \approx 733\,\Omega$

$\boxed{R_3 = 733\,\Omega}$

(2) $\Rightarrow$ $U_{R_2} = U_{BE} + I_E \cdot R_4 = -0.65 - 3m \cdot 1.6k$

$\approx -5.45\,V$

$I_2 = I_1 - I_B = \frac{-E - U_{R_2}}{R_1} - I_B = \frac{-12+5.45}{18k} - 21\mu = -342\,\mu A$

$R_2 = \frac{U_{R_2}}{I_2} = \frac{-5.45}{-342\mu} \approx 15.9\,k\Omega$

$\boxed{R_2 = 15.9\,k\Omega}$