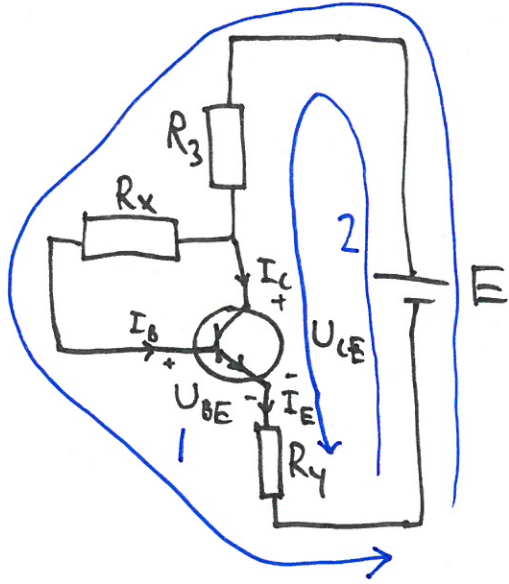


E-3) Likströms schema:



$$E = 12 \text{ V}$$

$$R_3 = 1000 \Omega$$

$$R_4 = 200 \Omega$$

$$U_{BE} = 0.70 \text{ V}$$

$$h_{FE} = 100$$

$$U_{CE} = 6.0 \text{ V}$$

$$(1) \quad E - R_3 \cdot (I_B + I_C) - R_x \cdot I_B - U_{BE} - R_4 \cdot I_E = 0$$

$$(2) \quad E - R_3 \cdot (I_C + I_B) - U_{CE} - R_4 \cdot I_E = 0$$

$$(3) \quad I_B + I_C = I_E$$

$$(4) \quad I_C = h_{FE} \cdot I_B \quad \Rightarrow \quad I_B = \frac{I_E}{1 + h_{FE}} \quad (5)$$

$$(2) \text{ \& } (3) \Rightarrow E - R_3 \cdot I_E - U_{CE} - R_4 \cdot I_E = 0 \Leftrightarrow I_E = \frac{U_{CE} - E}{-R_3 - R_4}$$

$$= \frac{6 - 12}{-1000 - 200} = \frac{-6}{-1200} = 5 \text{ mA} \Rightarrow I_E = 5 \text{ mA}$$

$$I_E = 5 \text{ mA} \text{ insatt i (5) ger: } I_B = \frac{5}{101} = 49.5 \mu\text{A}$$

$$(1) \text{ \& } (3) \Rightarrow E - R_3 \cdot I_E - R_x \cdot I_B - U_{BE} - R_4 \cdot I_E = 0 \Rightarrow$$

$$R_x = \frac{E - R_3 \cdot I_E - U_{BE} - R_4 \cdot I_E}{I_B} = \frac{12 - 1000 \cdot 5\text{m} - 0.7 - 200 \cdot 5\text{m}}{49.5 \mu}$$

$$= 107 \text{ k}\Omega$$