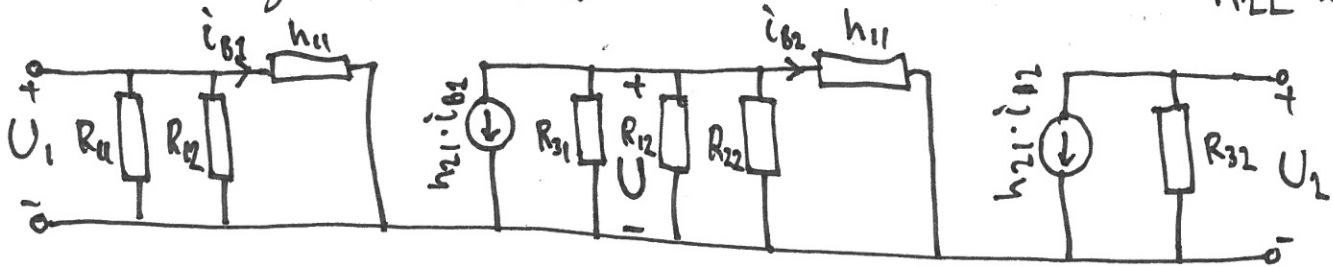


E-13) $R_{11} = R_{12} = 60 \text{ k}\Omega$, $R_{21} = R_{22} = 15 \text{ k}\Omega$
 $R_{31} = R_{32} = 1.0 \text{ k}\Omega$, $R_{41} = R_{42} = 400 \Omega$

$h_{11} = 1.0 \text{ k}\Omega$
 $h_{12} \approx 0$
 $h_{21} = 100$
 $h_{22} \approx 0$

Small signal schema:



$$F = \frac{U_2}{U_1} = \frac{U_2}{U} \cdot \frac{U}{U_1}$$

$$U_2 = -h_{21} \cdot i_{B2} \cdot R_{32}$$

$$U = h_{11} \cdot i_{B2}$$

$$U = -R \cdot h_{21} \cdot i_{B2}, \quad R = R_{31} \parallel R_{32} \parallel R_{22} \parallel h_{11} = 480 \Omega$$

$$U_1 = h_{11} \cdot i_{B1}$$

$$\Rightarrow F = \frac{-h_{21} \cdot R_{32} \cdot i_{B2}}{h_{11} \cdot i_{B2}} \cdot \frac{-R \cdot h_{21} \cdot i_{B1}}{h_{11} \cdot i_{B1}} =$$

$$= \frac{100 \cdot 1000}{1000} \cdot \frac{480 \cdot 100}{1000} = 4800$$

$$F = 4800$$

$$Z_{in} = R_{11} \parallel R_{12} \parallel h_{11} = 923 \Omega$$

$$Z_{in} = 923 \Omega$$

$$Z_{out} = R_{32} = 1 \text{ k}\Omega$$

$$Z_{out} = 1 \text{ k}\Omega$$