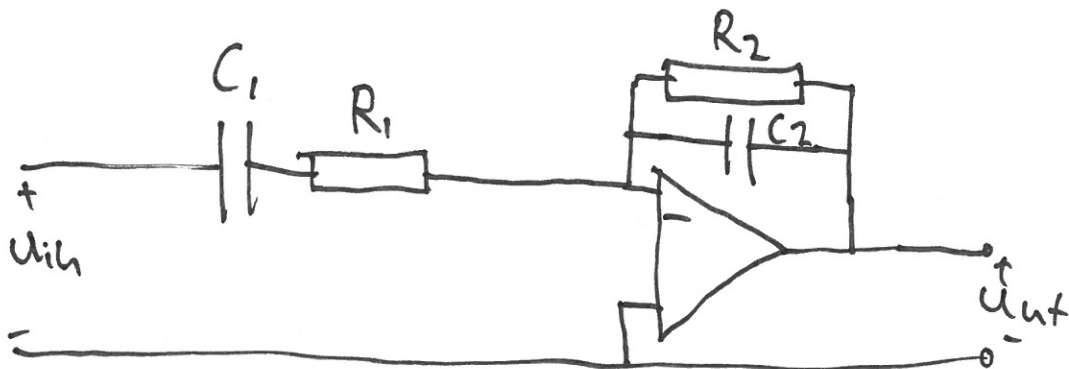
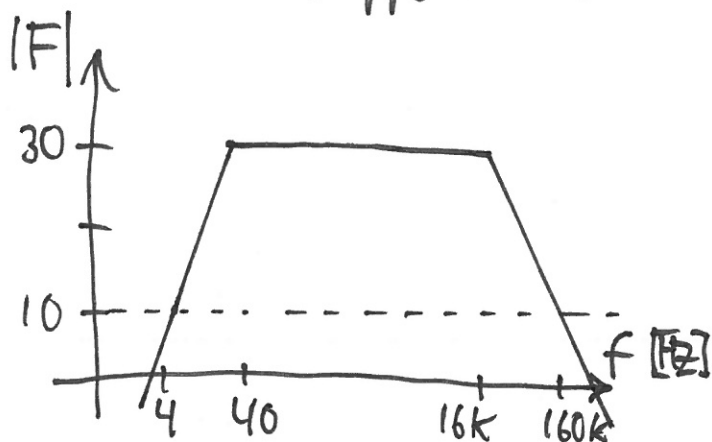


F 2.5) Sökt:

Aktivt filter enligt:



Med beloppskurva i Bode-diagram:



$$R_{in} > 20 \text{ k}\Omega$$

Från F2.3:


$$F = \frac{U_{out}}{U_{in}} = \frac{j\omega C_1 R_2}{(1 + j\omega C_2 R_2)(1 + j\omega C_1 R_1)} = -\frac{R_2}{R_1} \cdot \frac{1}{1 + j\omega C_2 R_2} \cdot \frac{j\omega C_1 R_1}{1 + j\omega C_1 R_1}$$

$$Z_{in} = \frac{1}{\underbrace{j\omega C_1}_{> 0}} + R_1 \Rightarrow R_1 = 20 \text{ k}\Omega \quad \approx 1 \text{ for } 4 \text{ kHz} < f < 16 \text{ kHz}$$

$$F = -\frac{R_2}{R_1} \left(\frac{1}{1 + j\omega C_2 R_2} \cdot \frac{j\omega C_1 R_1}{1 + j\omega C_1 R_1} \right) \approx -\frac{R_2}{R_1} \quad 40 \text{ Hz} < f < 16 \text{ kHz}$$

$$|F| = 30 \text{ dB} \Leftrightarrow F = 10^{\frac{30}{20}} = 31.6$$

$$\frac{R_2}{R_1} = 31.6 \Rightarrow R_2 = 31.6 \cdot R_1 = 31.6 \cdot 20 \text{ k} = 632 \text{ k}\Omega$$

$$F = -31.6 \cdot \frac{1}{1+j\omega C_2 R_2} \cdot \frac{j\omega C_1 R_1}{1+j\omega C_1 R_1}$$


$$f_0 = 16k = \frac{1}{2\pi \cdot \omega_0} = \frac{1}{2\pi \cdot \frac{1}{C_2 R_2}} \Rightarrow C_2 = \frac{1}{2\pi \cdot f_0 \cdot R_2} \Rightarrow C_2 = 15.7 \text{ pF}$$

$$f_u = 40 \Rightarrow C_1 = \frac{1}{2\pi \cdot 40 \cdot 20k} = 199 \text{ nF}$$