

Physics 262

Homework #2

Show your work.

For design problems, work to within 5% of specifications.

1. Design a passive RC low pass filter with cutoff frequency $f_1 = \frac{\omega_1}{2\pi} = 20$ kHz. We will call this filter 1. Calculate the gain $G_1(f)$ and phase $\phi_1(f)$.
2. Design a passive RC high pass filter with cutoff frequency $f_2 = \frac{\omega_2}{2\pi} = 20$ Hz. Choose component values so that it can be cascaded with filter 1. This is filter 2. Calculate the gain $G_2(f)$ and phase $\phi_2(f)$.
3. Assuming zero current at the outputs of both filters, calculate and sketch the combined response of the cascaded filters—both gain and phase.
4. Something is wrong with the circuit below.
 - (a) Is this intended to be a high pass or a low pass filter?
 - (b) Make the circuit well-behaved by rewiring as few components as possible (but use all of them, and the filter should fulfill its intended function).

