Homework 8

SOLUTIONS

Due: Friday November 15, 2019

PROBLEM#1:

Design a Butterworth band pass filter using the Case I circuit from Figure 6.11 to satisfy the following specifications:

Amax=1dB Pass band limits: 3kHz and 4kHz
Amin=25dB Stop band limits: 1.5kHz and 8kHz
Center Frequency Gain = 0dB

Note 1: Use voltage dividers on EACH STAGE of your filter, such that the individual gain of each section AT THE CENTER FREQUENCY OF THE FILTER is 0dB, thereby producing a band pass filter with 0dB center frequency gain.

Note 2: Plot the magnitude response of each stage, and the overall magnitude response of your filter.

PROBLEM#2:

Design a Chebyshev notch filter to satisfy the following specifications:

Amax=0.5dB Pass band limits: 2kHz and 5kHz
Amin=25dB Stop band limits: 2.5kHz and 4kHz

Note 1: Please just provide ω_o and Q of each second order section. DO NOT design the circuit.

Note 2: Use MATLAB to plot the predicted MAGNITUDE RESPONSE for your filter. Assume the maximum gain is 0dB for purposes of plotting your response. Make sure to zoom in on your plot to make sure your design meets your desired filter specifications.

PROBLEM #3:

Design a Butterworth notch filter to satisfy the following specifications:

Amax=2dB Pass band limits: 15kHz and 40kHz
Amin=25dB Stop band limits: 20kHz and 30kHz

Note 1: Please just provide ω_o and Q of each second order section. DO NOT design the circuit.

Note 2: Use MATLAB to plot the predicted MAGNITUDE RESPONSE for your filter. Assume the maximum gain is 0dB for purposes of plotting your response. Make sure to zoom in on your plot to make sure your design meets your desired filter specifications.