

Assignment 8: Lowpass Analog Filter

Due: Tuesday, June 3

The objective of this homework assignment is to construct a simple program for the design of *analog lowpass Butterworth filters*.

The input to your program will be the standard design specifications, including (a) passband frequency, (b) maximum passband attenuation, (c) stopband frequency, and (d) minimum stopband attenuation.

To test your program, apply specifications:

1. *Passband frequency:* $\omega_p = 5k \text{ rad/sec}$
2. *Max. passband attenuation:* $\alpha_{max} = 0.5 \text{ dB}$
3. *Stopband frequency:* $\omega_s = 10k \text{ rad/sec}$
4. *Min. stopband attenuation:* $\alpha_{min} = 20 \text{ dB}$

For the design, your results should include:

- a. the order of the filter,
- b. cutoff frequency ω_c ,
- c. locations of the poles,
- d. the transfer function,
- e. frequency-response plot (amplitude only) of the lowpass filter, and
- f. verification of your design by evaluating the frequency response at the passband and stopband frequencies.

Outline the steps of your design procedure and attach the code to the report. Derivations are not necessary.