

Lab 9

EE 324: Signals and Systems II

In this lab section we will learn how to design analog filters.

1 Prelab assignment

1. Get familiar with the butter function in matlab <https://www.mathworks.com/help/signal/ref/butter.html>
2. Get familiar with the cheby1 function in matlab <https://www.mathworks.com/help/signal/ref/cheby1.html>
3. Get familiar with the cheby2 function in matlab <https://www.mathworks.com/help/signal/ref/cheby2.html>
4. Get familiar with the ellip function in matlab <https://www.mathworks.com/help/signal/ref/ellip.html>

2 Lab assignment

1. Design 4-th order Butterworth low-pass filter with cutoff frequency of 10^9 rad/s .
2. Design 4-th order Chebyshev Type I low-pass filter with cutoff frequency of 10^9 rad/s .
3. Design 4-th order Chebyshev Type II low-pass filter with cutoff frequency of 10^9 rad/s .
4. Design 4-th order Elliptic low-pass filter with cutoff frequency of 10^9 rad/s .
5. Compare the bode plots of the filters in 1 – 4. Describe your observations.
6. Generate a signal $x(t) = \sin(t) + \sin(5t) + \sin(25t)$.
7. Design a low-pass filter to extract $\sin(t)$. You can try different types of filters and compare their performances.
8. Design a band-pass filter to extract $\sin(5t)$. You can try different types of filters and compare their performances.
9. Design a high-pass filter to extract $\sin(25t)$. You can try different types of filters and compare their performances.