Assignment-2
BEE-12 (CD)
Digital Signal Processing
Due Date: 15 May 2023

Problem

From your text book (as uploaded to LMS already), see examples 7.5 and 7.6.

Task:

1. Do these exercises on paper by hand, write down the characteristic equations of Chebyshev and Elliptic lowpass filters (from literature). Find the poles/zeros and/or coefficients of the designed discrete-time filters $H(z)$. Using coefficients, plot the magnitude response in both examples using Matlab. Plot should be complete in title and x-axis and y-axis units.
2. In Matlab, load a clean and noisy signal (uploaded to LMS), design a filter to suppress all frequencies except 1kHz and 1.5kHz. You are only allowed to use a 2nd order Butterworth bandpass filter and a 2nd order Butterworth bandstop filter. Devise a scheme to achieve you target with a combination of these two filters. The sampling frequency of the signal is 6kHz.
    a. Plot clean and noisy signals as well as their frequency spectrums (recall labs). The x-axis and y-axis should be correctly labeled. The x-axis should be in Hz while y-axis should be spectral magnitude.
    b. Design and plot bandpass and bandstop filters and plot their magnitude and phase responses. You can use Matlab command "butter". Apply the filters on the noisy signal and plot the output.

Deliverable:

1. Maltab .mlx file with a code and explanation.
2. You can work in a group of two.
3. Write a short report (in the same .mlx file) on how you designed your filtering scheme.

4. Only one signal and running .mlx file is allowed to be uploaded, any other file or multiple files/zip/rar will not be marked.