Laboratory Work #04

DIGITAL SIGNAL PROCESSING (DSP)

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1. Design a Butterworth bandpass IIR filter. The desired specifications of the digital filter are as follow: normalized passband edges as $\omega_{p1} = 0.45\pi$ and $\omega_{p2} = 0.65\pi$, normalized stopband edges at $\omega_{s1} = 0.3\pi$ and $\omega_{s2} = 0.75\pi$, passband ripple of 1dB, and a minimum stopband attenuation of 40dB. Plot the gain and phase responses using MATLAB.

2. Using the M-file fir1, design a linear-phase FIR bandpass filter with the following specifications: stopband edges at 0.6π and 0.8π, passband edges at 0.65π and 0.75π, maximum passband attenuation of 0.2 dB, and minimum stopband attenuation of 42 dB. Using each of the following windows for the design: Hamming, Hann and Kaiser. Show the impulse response coefficients, and plot the gain response of the designed filters for each case.