**Experiment 5 FIR Filter Design**

1. Write a MATLAB program to plot time and frequency domain characteristics of rectangular, Bartlett, Blackman, Hamming and Hanning window functions with given length. Plot time domain characteristics in one plot for all windows and frequency domain characteristics in one plot for all windows.

Note: Use inbuilt functions: window.

1. Design a digital linear phase FIR highpass filter with following specifications using proper window function: (Select window function analytically)



Write a MATLAB program to calculate all the required parameters (only select window analytically), plot the frequency response in 0 to pi range. Determine stop band attenuation and passband ripple of the designed filter. Display the filter is meeting the designed specifications or not.

Note: Use the inbuilt functions fir1 and window.

1. Repeat the above problem for bandpass filter with given specifications:



**Experiment 6 IIR Filter Design - I**

(i) Write a MATLAB program to design an IIR digital lowpass filter using Butterworth, Chebyshev-I, Chebyshev-II and Elliptic approximation. Determine order, cut off frequency, pole-zero pattern and frequency response plots in each case. Obtain second order cascade structure for the designed IIR filter.

Specifications:



Note: Use in-built functions: buttord, butter, cheb1ord, cheby1, cheb2ord, cheby2, ellipord, ellip, tf2sos.

1. Write a MATLAB program to design an IIR digital highpass filter using Butterworth approximation. Determine order, cut off frequency, pole-zero pattern and frequency response plots. Obtain second order cascade structure for the designed IIR filter.

Specifications:



Note: Use in-built functions: buttord, butter, tf2sos.

**Experiment 7 IIR Filter Design –II and Filter Design and Analysis Tools**

1. Write a MATLAB program to design an IIR digital bandpass filter using Butterworth approximation. Determine order, cut off frequency, pole-zero pattern and frequency response plots. Obtain second order cascade structure for the designed IIR filter.

Specifications:



Note: Use in-built functions: buttord, butter, tf2sos.

1. Write a MATLAB program to design an IIR digital bandstop filter using Butterworth approximation. Determine order, cut off frequency, pole-zero pattern and frequency response plots. Obtain second order cascade structure for the designed IIR filter.

Specifications:



Note: Use in-built functions: buttord, butter, tf2sos.

1. Explore filter Visualization Tool: fvtool 🡺 A Graphical User Interface (GUI) that allows you to analyze digital filters.

Explore filter Designer Tool: filterDesigner 🡪 A Graphical User Interface (GUI) that allows you to design or import, and analyze digital FIR and IIR filters.

Explore designfilt function.