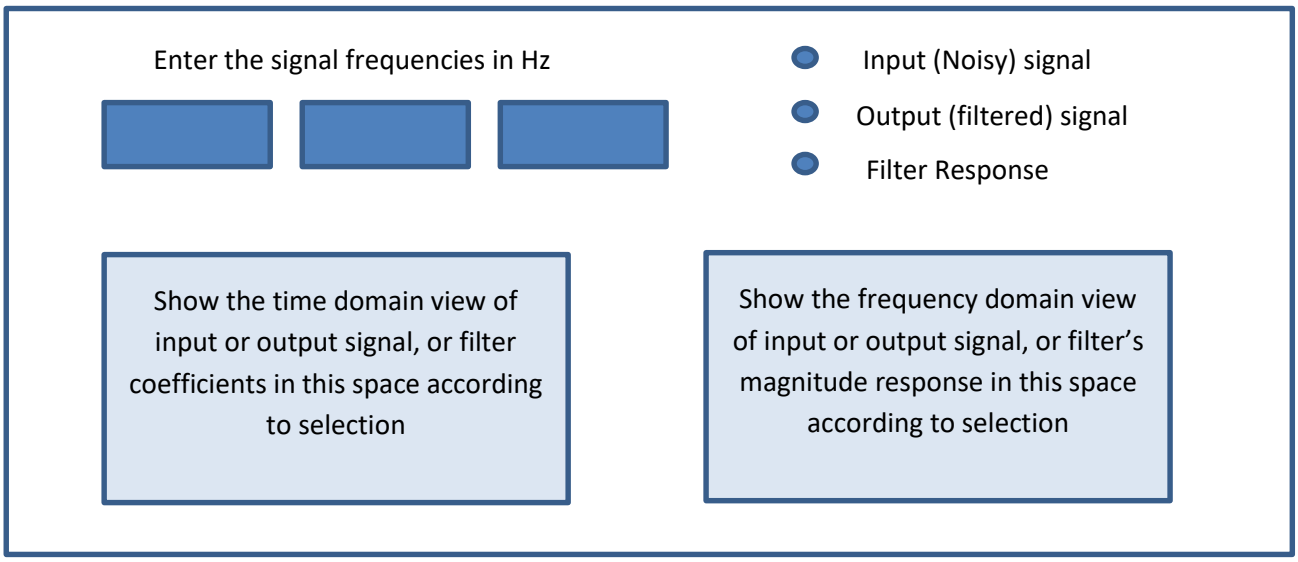
ECE/EEE F434 –Digital Signal Processing – Lab comprehensive examination
Date – 10/11/2019, Part B – Open book exam

Design a GUI for the filter designed in Part-A as follows:



- In a GUI, provide space for user to enter three values. Three separate space/boxes should be provided. User will enter the three values of signal frequencies in Hz. These values will be between 0 to FS/2. (Here, FS-Sampling freq). Program should generate the corresponding three sinusoidal signals of amplitude 1V each. Summation of these three sinusoidal signals is the input to the filter designed.

- When the user selects option to view the input signal, program should provide the time domain and frequency domain view of the signal in the spaces provided. Use the time scale as 0 to 0.01 sec, and amplitude scale as -3 to 3V. Frequency domain view should be neat, one sided spectrum from 0 to FS/2. (Here, FS-Sampling freq), plotted as magnitude vs. Freq in Hz.

- When user selects option to view output signal, program should generate the time-domain and frequency domain view of the output signal of the filter. Instruction for the plot same as above.

- When user selects option to view filter response, a time-domain (impulse response) of the filter should be provided in the time-domain space. And filter's magnitude response should be provided in the freq-domain space. Impulse response should be a plot of h(n) vs n, and freq domain plot should be 'Magnitude in dB vs Freq in Hz'.

- Filter coefficients should be generated using fir1 function only.

- All axis labels and titles of the plot are to be generated by the program accordingly.

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Filter specifications for reference

Q.1 – For ID no. ending with 0,1, and 2.

Bandpass filter – fs1 = 100 Hz, fp1 = 950 Hz, fp2 = 1200 Hz, and fs2 = 2000 Hz. Sampling freq = 4800 Hz. Stopband attenuation required is 48 dB.

Q.2 – For ID no. ending with 3, and 4.

Low-pass filter – fp = 1500 Hz, fs = 4100 Hz. Sampling freq = 10000 Hz. Stopband attenuation required is 60 dB.

Q.3 – For ID no. ending with 5 and 6.

High-pass filter – fs = 500 Hz, fp = 1800 Hz, Sampling freq = 4000 Hz. Stopband attenuation required is 60 dB.

Q.4 – For ID no. ending with 7,8, and 9

Bandstop filter – fp1 = 200 Hz, fs1 = 1000 Hz, fs2 = 1600 Hz, and fp2 = 2400 Hz. Sampling freq = 5200 Hz. Stopband attenuation required is 48 dB.

Upload the single ZIP file with name as LC_ID no.zip, consisting of 2 files - .fig and .m of part B.