

Project-1

And Result:

Design appropriate filters to isolate specific frequency components from a composite input signal.

Input Signal: The input signal is a sum of sine waves with the following frequencies:

$$\text{Input Signal} = A_1 \cdot \sin(2\pi \cdot 100 \cdot t) + A_2 \cdot \sin(2\pi \cdot 200 \cdot t) + A_3 \cdot \sin(2\pi \cdot 300 \cdot t) + A_4 \cdot \sin(2\pi \cdot 400 \cdot t)$$

Task: Suggest appropriate filters to isolate the following frequency components from the input signal. You will need to decide on the filter type (Low Pass, High Pass, Band Pass, or Band Stop) and specify the cutoff frequency or frequencies.

Frequency Component	Filter Type	Cutoff Frequency / Frequencies
100 Hz	Low-Pass Filter (LPF)	Cutoff frequency = 150 Hz
400 Hz	High-Pass Filter (HPF)	Cutoff frequency = 350 Hz
100 Hz and 200 Hz	Low-Pass Filter (LPF)	Cutoff frequency = 250 Hz
200 Hz	Band-Pass Filter (BPF)	190 – 210 Hz
300 Hz	Band-Pass Filter (BPF)	290 – 310 Hz
300 Hz and 400 Hz	High-Pass Filter (HPF)	Cutoff frequency = 250 Hz
200 Hz and 300 Hz	Band-Pass Filter (BPF)	150 – 350 Hz
200 Hz, 300 Hz, and 400 Hz	High-Pass Filter (HPF)	Cutoff frequency = 150 Hz
100 Hz and 400 Hz	Band-Stop Filter (BSF)	150 – 350 Hz

This is review

Design appropriate filters to isolate specific frequency components from a composite input signal.

Input Signal: The input signal is a sum of sine waves with the following frequencies:

$$\text{Input Signal} = A_1 \cdot \sin(2\pi \cdot 100 \cdot t) + A_2 \cdot \sin(2\pi \cdot 200 \cdot t) + A_3 \cdot \sin(2\pi \cdot 300 \cdot t) + A_4 \cdot \sin(2\pi \cdot 400 \cdot t)$$

Task: Suggest appropriate filters to isolate the following frequency components from the input signal. You will need to decide on the filter type (Low Pass, High Pass, Band Pass, or Band Stop) and specify the cutoff frequency or frequencies.

Instructions:

For each of the frequency components listed below, fill in the table with the corresponding filter type and cutoff frequency/frequencies:

A	B	C
Frequency Component	Filter Type	Cutoff Frequency / Frequencies
100 Hz	Low-Pass Filter (LPF) ✓	Cutoff frequency = 150 Hz
400 Hz	High-Pass Filter (HPF) ✓	Cutoff frequency = 350 Hz
100 Hz and 200 Hz ✓	Low-Pass Filter (LPF)	Cutoff frequency = 250 Hz
200 Hz	Band-Pass Filter (BPF)	190 – 210 Hz
300 Hz	Band-Pass Filter (BPF)	290 – 310 Hz
300 Hz and 400 Hz } Limit	High-Pass Filter (HPF)	Cutoff frequency = 250 Hz
200 Hz and 300 Hz } Limit	Band-Pass Filter (BPF)	150 – 350 Hz
200 Hz, 300 Hz, and 400 Hz	High-Pass Filter (HPF)	Cutoff frequency = 150 Hz
100 Hz and 400 Hz	Band-Stop Filter (BSF) ✓	150 – 350 Hz

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