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| Name: Saran Natarajan  Assignment: Low Pass Filter Assignment |
| 1. Use the Wavegen tool in WaveForms to generate sine waves at multiple frequencies.  Suggested test frequencies: 100 Hz, 500 Hz, 1 kHz, 2 kHz, 5 kHz, and 10 kHz. |
| **• Plot of Gain (dB) vs Frequency**  Calculations are done on excel file “datacollection\_lowpassfilter.xlsx “ (present in the data folder of git hub repository).  Plot of Gain vs Frequency done using Python’s matplotlib.pyplot library     |  |  |  |  |  | | --- | --- | --- | --- | --- | | **InputFreq** | **InputAmp** | **OutputAmpx2** | **OuputAmp** | **Gain in db** | | 10 | 1 | 1.921 | 0.9605 | -0.35005 | | 20 | 1 | 1.7166 | 0.8583 | -1.32722 | | 30 | 1 | 1.4986 | 0.7493 | -2.50689 | | 35 | 1 | 1.3828 | 0.6914 | -3.20541 | | 50 | 1 | 1.1308 | 0.5654 | -4.95288 | | 100 | 1 | 0.653 | 0.3265 | -9.72234 | | 500 | 1 | 0.14714 | 0.07357 | -22.666 | | 1000 | 1 | 0.07766 | 0.03883 | -28.2167 | | 2000 | 1 | 0.04087 | 0.020435 | -33.7925 | | 5000 | 1 | 0.01608 | 0.00804 | -41.8949 | | 10000 | 1 | 0.00845 | 0.004225 | -47.4835 | |
| • Screenshots of the WaveForms GUI setup  Attaching setup for 10Hz frequency input below  Wavegen Setup for 10Hz:    Scope setup for 10Hz:    Wavegen setup for 20Hz:    Scope setup for 20Hz:    Wavegen setup for 30Hz:    Scope setup for 30Hz:    Wavegen setup for 35Hz:    Scope setup for 35Hz:    Wavegen setup for 50Hz:    Scope setup for 50Hz:    Wavegen setup for 100Hz:    Scope setup for 100Hz:    Wavegen setup for 500Hz:    Scope setup for 500Hz:    Wavegen setup for 1kHz:    Scope setup for 1kHz:    Wavegen setup for 2kHz:    Scope setup for 2kHz:    Wavegen setup for 5kHz:    Scope setup for 5kHz:    Wavegen setup for 10kHz:    Scope setup for 10kHz:    • Concise summary of observations   1. Using wavegen (Channel 1) generated the sine wave at different frequencies from 10Hz to 10kHz. 2. Input waveform: Amplitude=1V and Offset=1V 3. Used to scope to record the output data with 100kHz sampling rate. Measured the peak-to-peak amplitude for each output waveform. Recorded all the data values in excel sheet 4. Executed python code to get all the data in a pandas data frame and plotted gain vs frequency using matplot lib.   Plot matches the frequency response of a low pass filter. Gain reduces as frequency increases. |
| **Part 3: Git and GitHub Documentation [4 points]**  **Task**   1. Create a public GitHub repository named: low-pass-filter-analysis-<yourname> 2. Organize your repository with the following structure:     3. Your repository must also include the code you wrote for the previous assignment.  4. The README.md file must briefly document:  • Assignment objectives  • Steps taken in each part  • Key observations and outcomes  5. Use a minimum of three Git commits to demonstrate use of version control. |