

**International Islamic University Islamabad Faculty of
Engineering and Technology Department of
Electrical and Computer Engineering**

VLSI DESIGN LAB



EXPERIMENT # 06: AC Sweep and Transfer Function Analysis of Active Filters

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Roll No.: 1071-F22

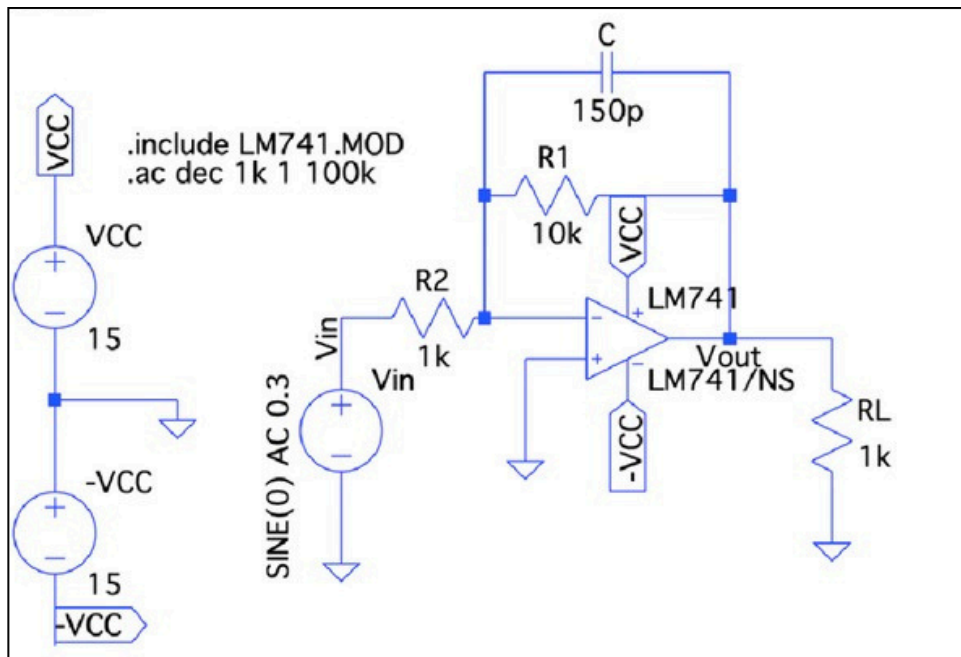
Date of Experiment: 29-Oct-2025

Lab Performance Report#6

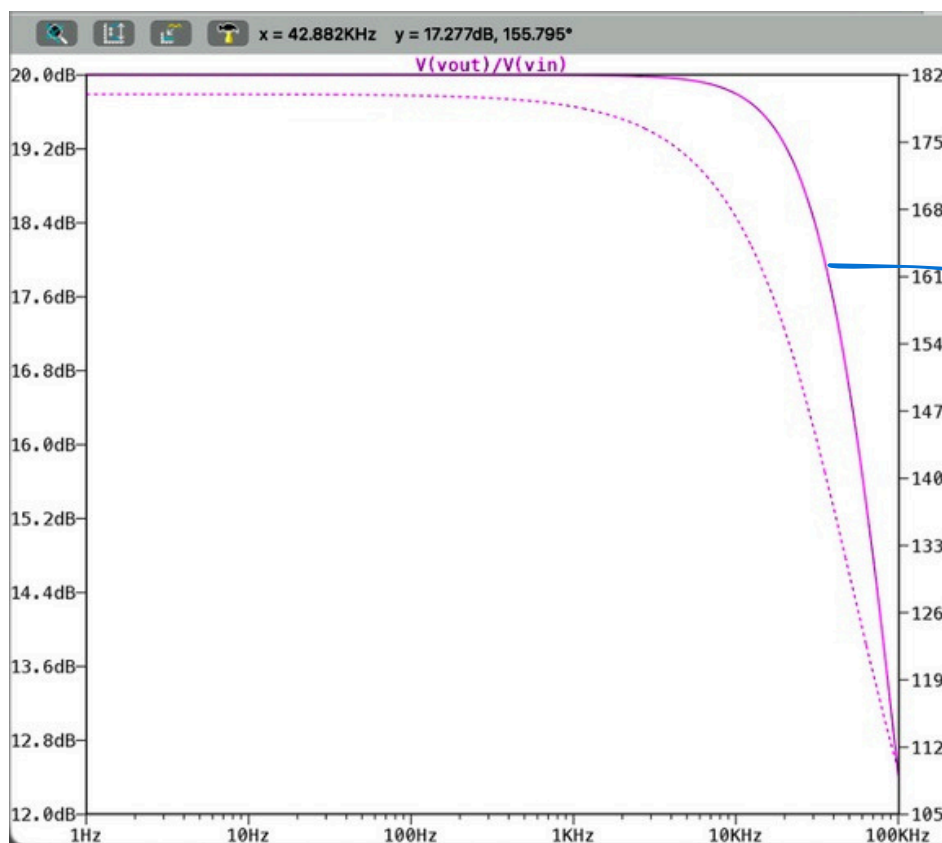
- **Task#1:** Create a schematic of Active **Low Pass Filter** using LM741 operational amplifier in LTSpice. Perform its **AC Sweep analysis** from **10 to 100kHz** and plot the magnitude and phase plots of “Transfer Function”.
 - Adjust the maximum gain of this LPF to be **20dB** and cutoff (-3dB) frequency to **40kHz** by varying the resistor and capacitor values.Save your initial and final Bode Plots and present them in lab report along with their respective schematics. What did you conclude/observe from this experiment?
- **Task#2:** Create a schematic of Active **High Pass Filter** using LM741 operational amplifier in LTSpice. Perform its AC Sweep analysis from **10 to 100kHz** and plot the magnitude and phase plots of “Transfer Function”.
 - Adjust the maximum gain of this HPF to be **10dB** and cutoff (-3dB) frequency to **100Hz** by varying the resistor and capacitor values.Save your initial and final Bode Plots and present them in lab report along with their respective schematics. What did you conclude/observe from this experiment?
- **Task#3:** Create a schematic of Active **Band Pass Filter** using LM741 operational amplifier in LTSpice. Perform its AC Sweep analysis from **10 to 100kHz** and plot the magnitude and phase plots of “Transfer Function”.
 - Adjust the gain of this LPF to be **10dB** and cutoff frequencies “from **100Hz** (f_L) to **20k Hz** (f_H)”.
 - Save your initial and final Bode Plots and present them in lab report along with their respective schematics. What did you conclude/observe from this experiment?
- Submit a report in MS-Word format in Google Class whose structure should be:
 - o Title Page
 - o Screenshots of each of the above tasks. **Each task** should be arranged on **one page** i.e. schematic/spice_netlist on top, its waveform/outputs below it and your remarks/analysis in a few lines.
- **Caution:** There is no unique solution to this assignment. All submissions should be different, like wiring of your schematic and selection of circuit parameters, inputs and outputs. **Zero marks will be awarded for exact copies, so avoid sharing your assignments with friends.**

Task 1 :

schematic



WAVEFORM

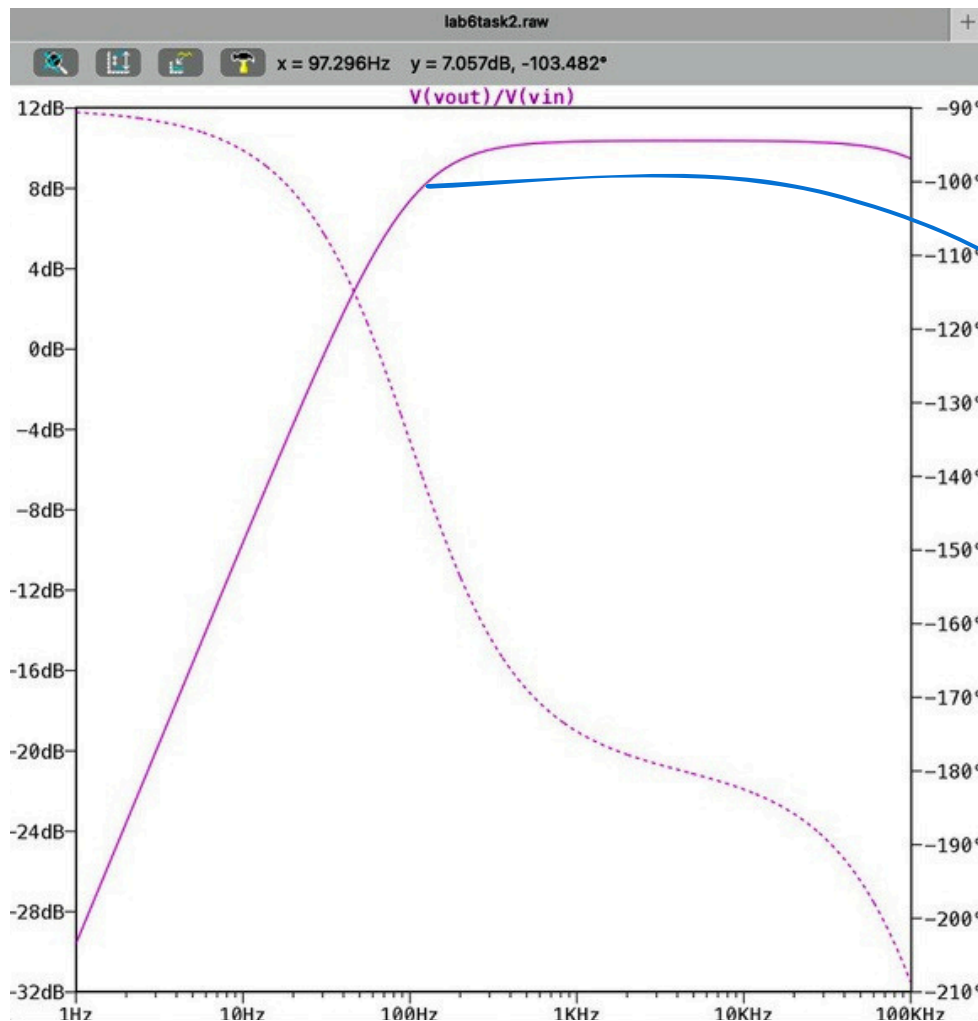
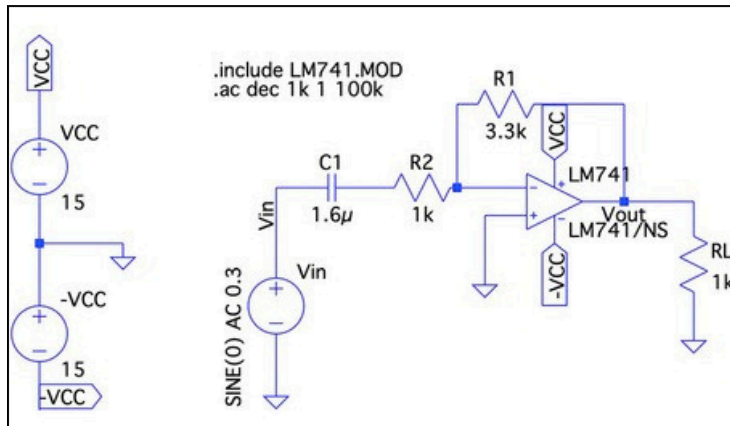


observations:

The filter successfully attenuated high frequencies above 40 kHz while maintaining a maximum gain of around 20 dB in the passband.

Task2 :

schematic & WAVEFORM



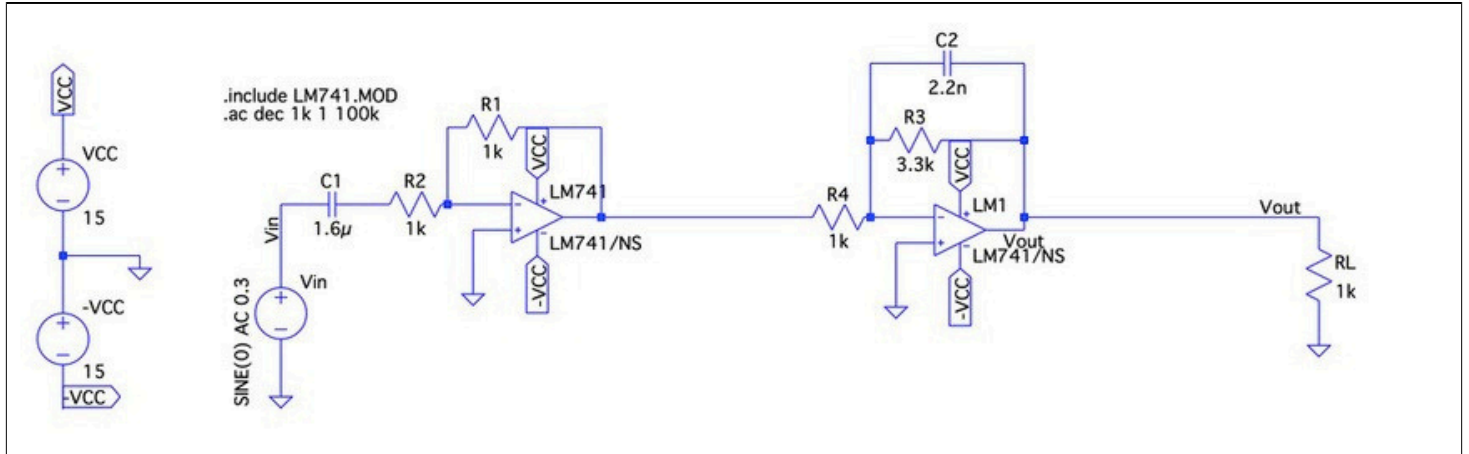
lab6task2.raw
x = 97.296Hz y = 7.057dB, -103.482°

observations:

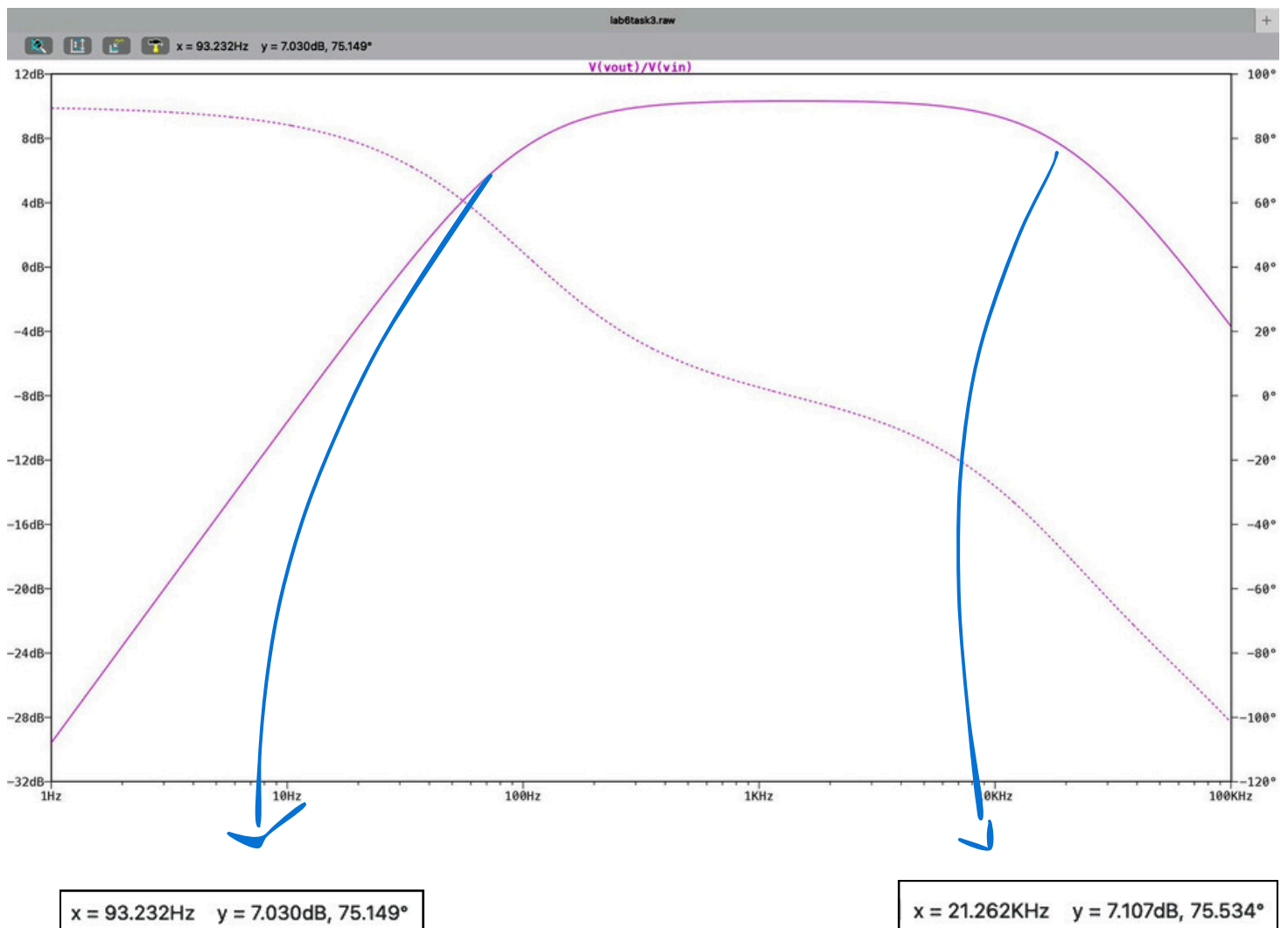
The output showed that low frequencies below 100 Hz were attenuated, while higher frequencies passed with a gain of nearly 10 dB.

task 3 :

schematic



WAVEFORM



observations: The achieved lower and upper cutoff frequencies were almost equal to the desired 100 Hz and 20 kHz limits. The filter allowed signals within this range to pass with a gain of about 10 dB, effectively combining the behavior of both high-pass and low-pass filters.