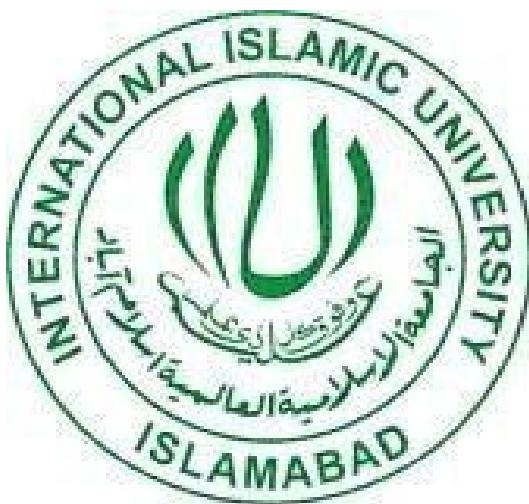


**International Islamic University Islamabad Faculty of  
Engineering and Technology Department of  
Electrical and Computer Engineering**

**VLSI DESIGN LAB**



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

**Name of Student:** Bushra Nazir Ahmed

**Roll No.:** 1071-F22

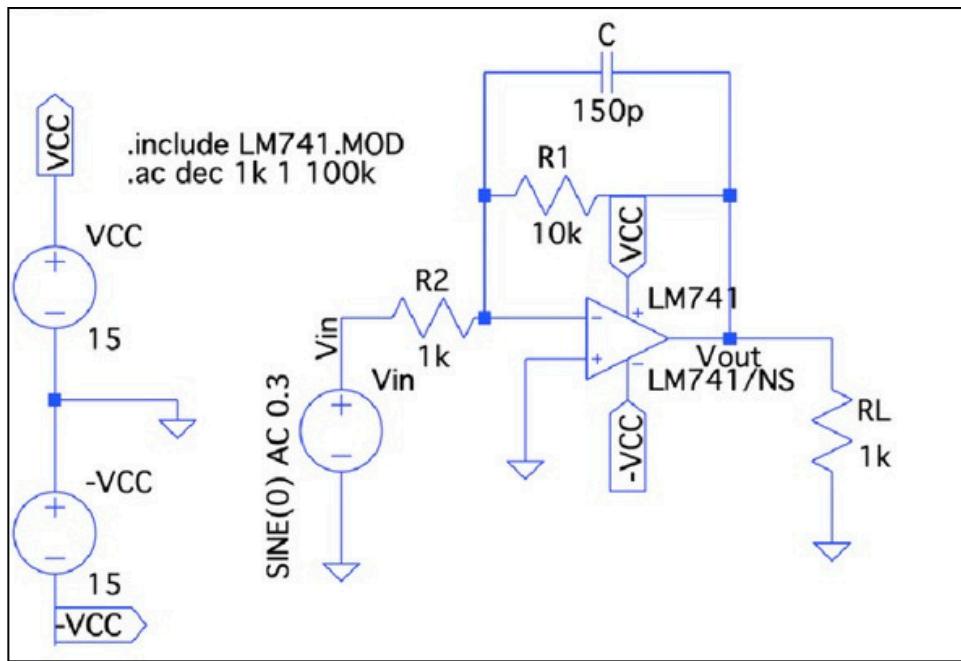
**Date of Experiment:** 29-Oct-2025

# Lab Performance Report#6

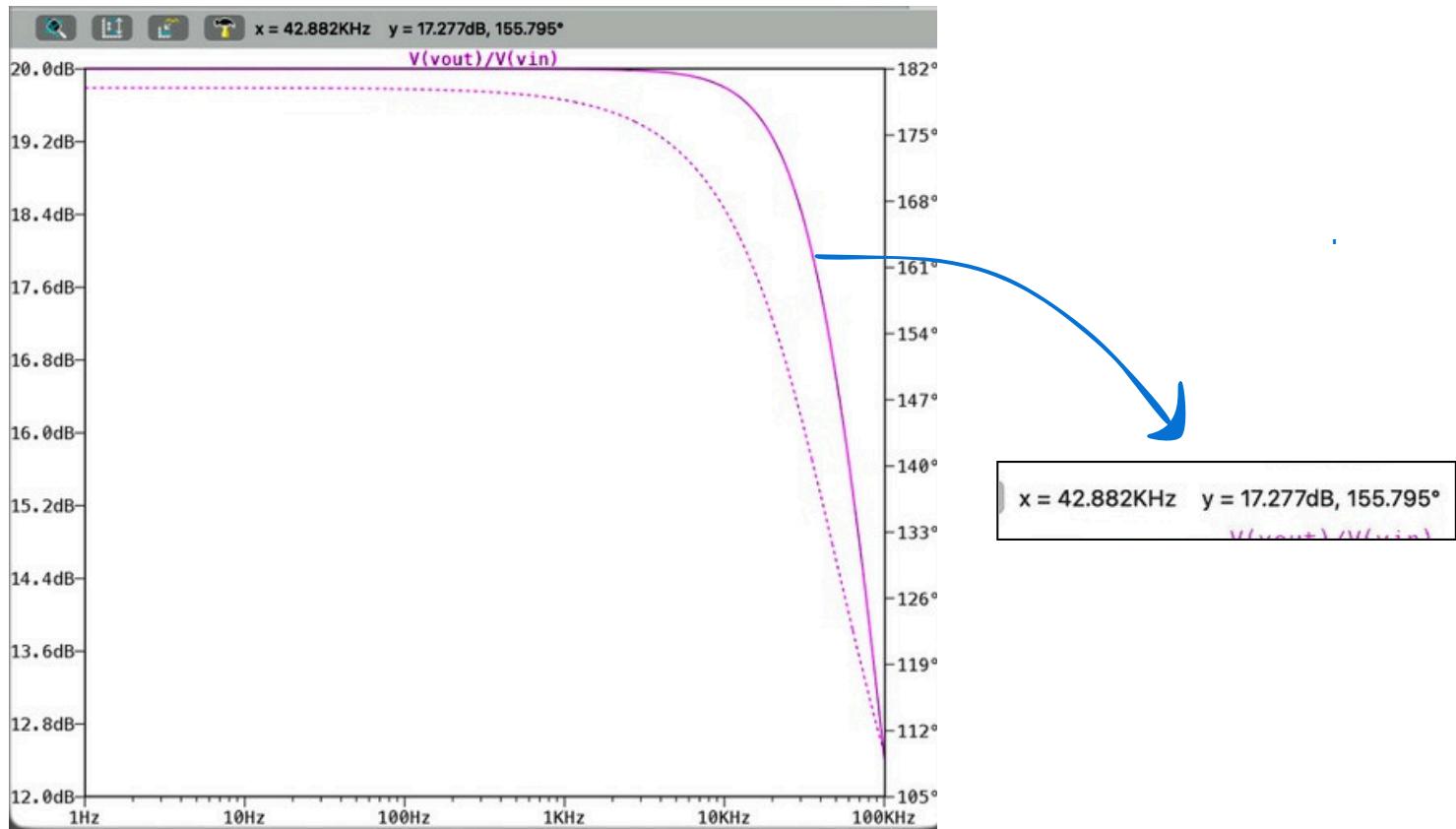
- **Task#1:** Create a schematic of Active **Low Pass Filter** using LM741 operational amplifier in LTSpice. Perform its **AC Sweep analysis** from **10 to 100kHz** and plot the magnitude and phase plots of “Transfer Function”.
  - Adjust the maximum gain of this LPF to be **20dB** and cutoff (-3dB) 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<sub>L</sub>) to 20k Hz (f<sub>H</sub>)**”.
  - 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:
  - Title Page
  - 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**

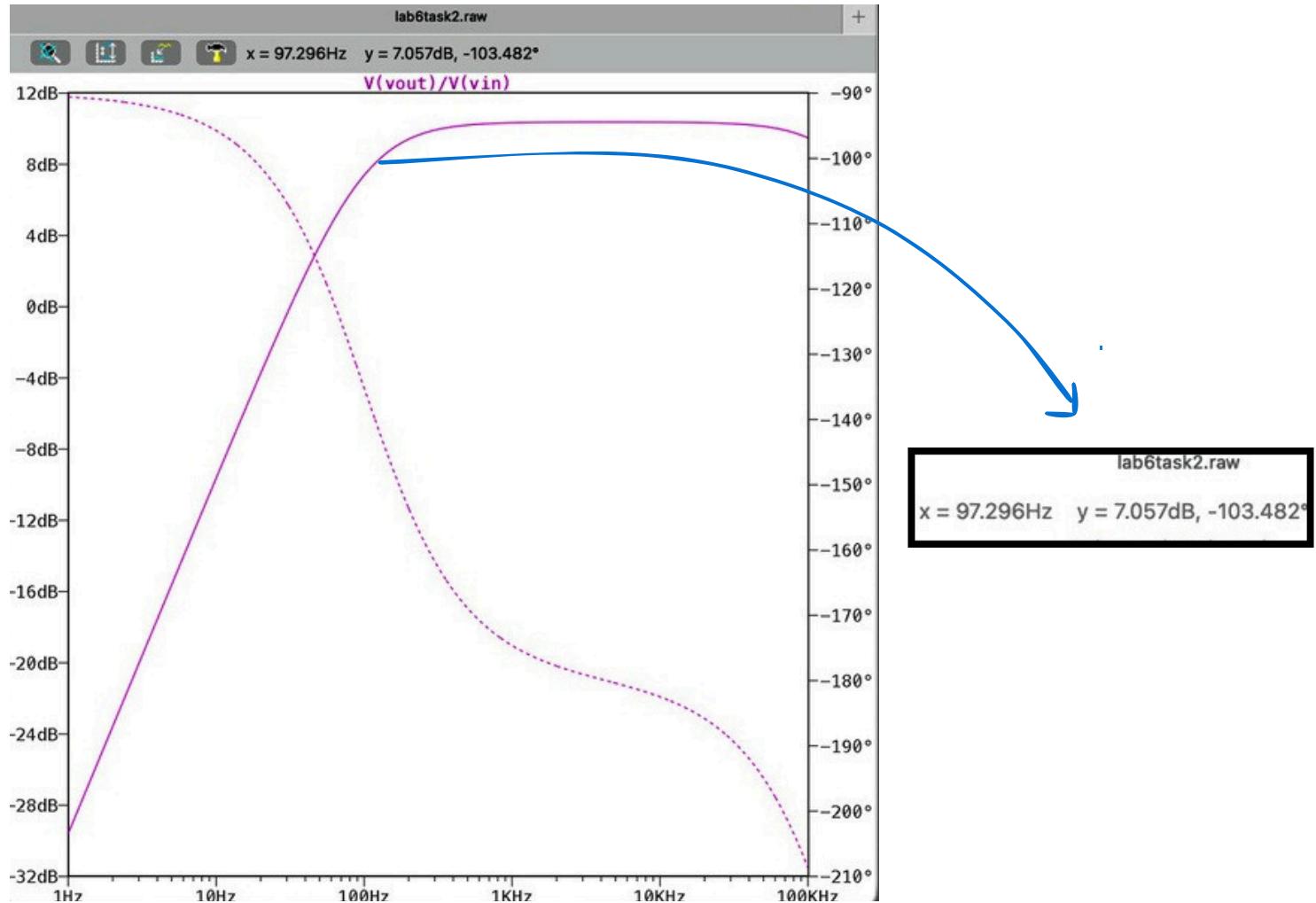
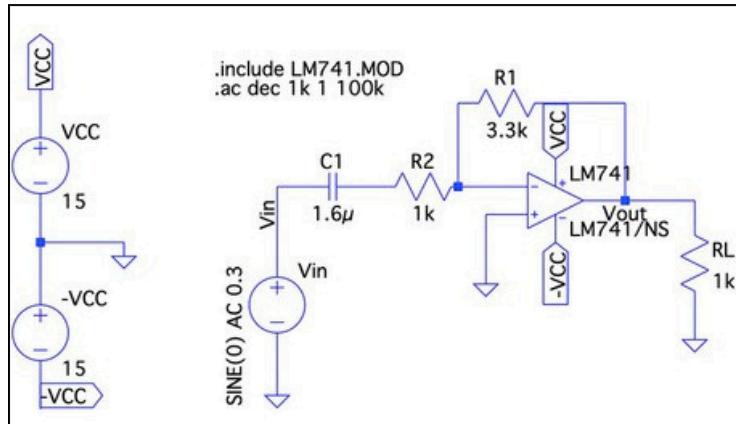


**observations:**

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

## Task2 :

### schematic & WAVEFORM

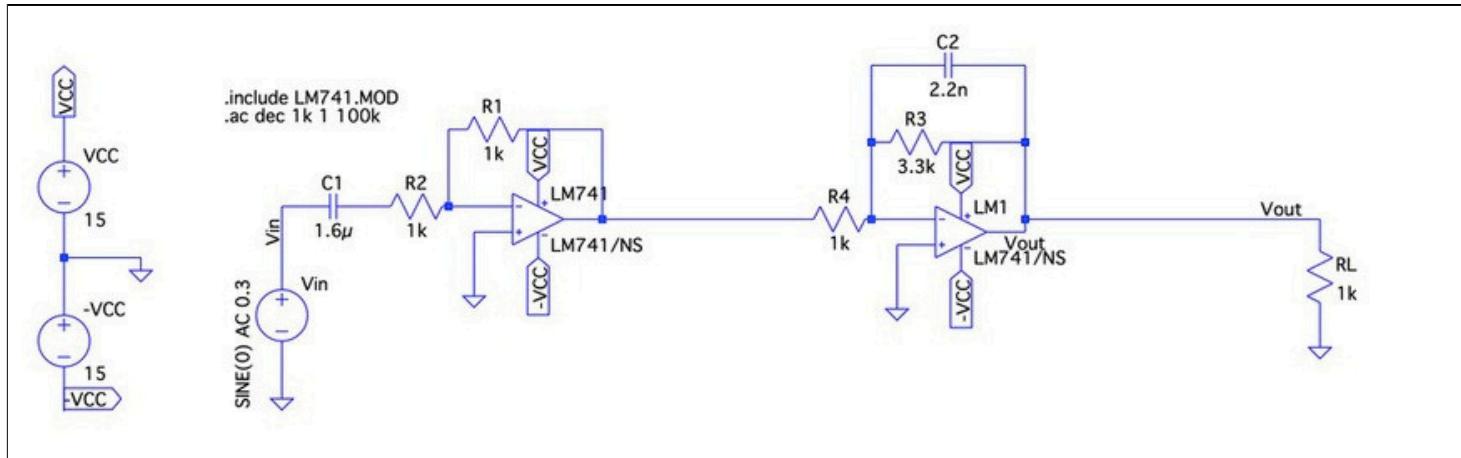


### observations:

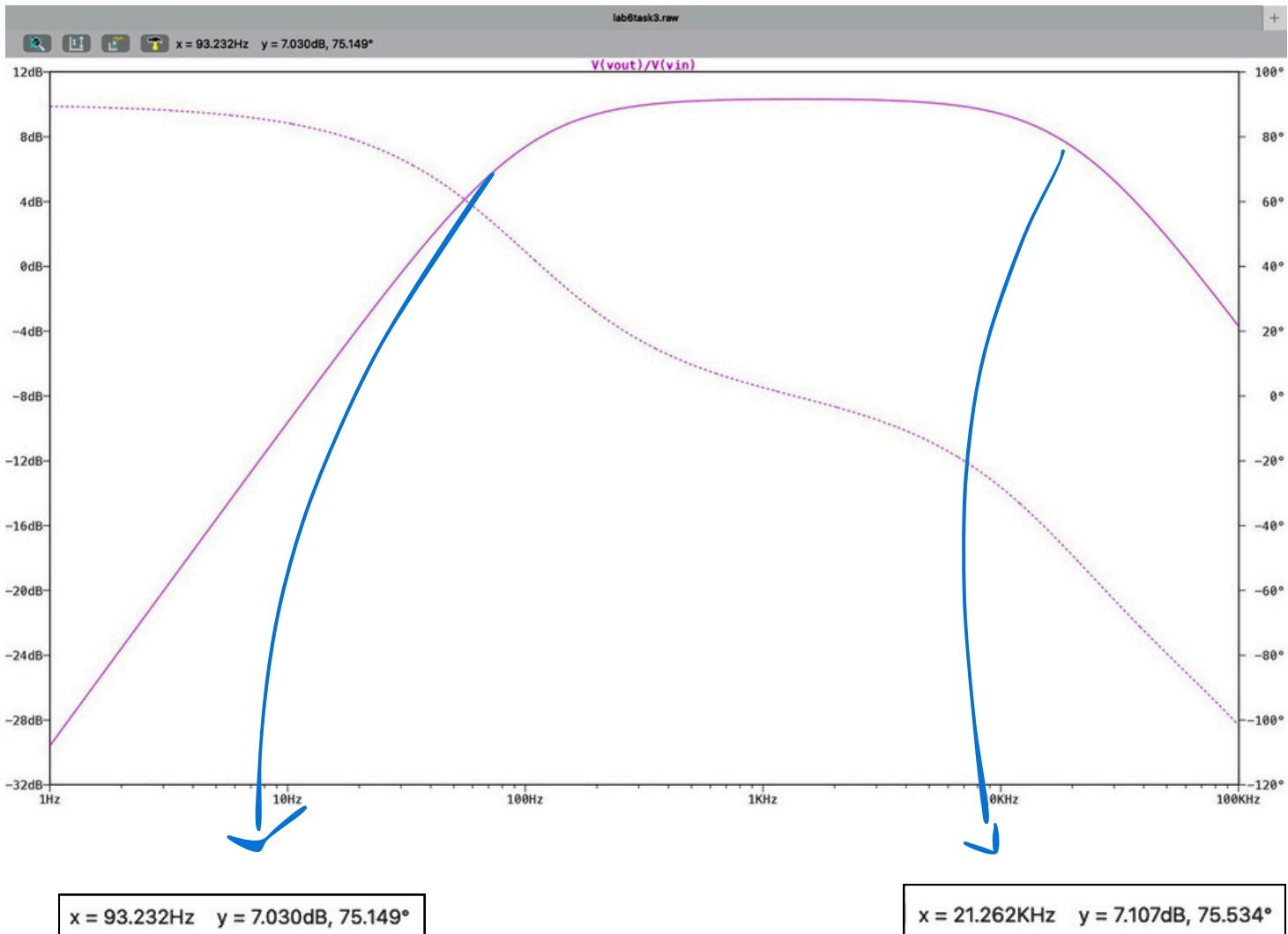
The output showed that low frequencies below 100 Hz were attenuated, while higher frequencies passed with a gain of nearly 10 dB.

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.