HIGH PASS FILTER

High-pass filters are fundamental tools in both analog and digital signal processing. They are used to allow high-frequency signals to pass while blocking low-frequency components, making them essential in a variety of technical fields and practical applications. Understanding their design, implementation, and application is critical for engineers and scientists working with signal processing.

SIMULATION RESULTS:

1. Objective:

Create and simulate a simple RC high-pass filter in Tinker cad to understand its behavior and response to different input signals.

2. Components Required:

- Resistor (R)
- Capacitor (C)
- Signal Generator (Function Generator)
- Oscilloscope (or Voltmeter)

3. Circuit Design:

RC High-Pass Filter Configuration:

- Connect the resistor (R) and capacitor (C) in series.
- The input signal is applied to the series combination of the resistor and capacitor.
- The output signal is taken across the resistor.

4. Setting Up the Simulation in Tinker cad:

Create a New Circuit:

- Open Tinker cad and navigate to the Circuits section.
- Click on "Create new Circuit."

Place Components:

Drag and drop the following components onto the workspace:

- Resistor: Typically, start with a value like 1 kΩ.
- Capacitor: Typically, start with a value like 100 nF.
- Function Generator: This will be used to provide the input signal.
- Oscilloscope: To visualize the input and output signals.

Connect the Circuit:

- Connect one terminal of the capacitor to the positive terminal of the function generator.
- Connect the other terminal of the capacitor to one terminal of the resistor.
- Connect the other terminal of the resistor to the ground.

Connect the oscilloscope probes:

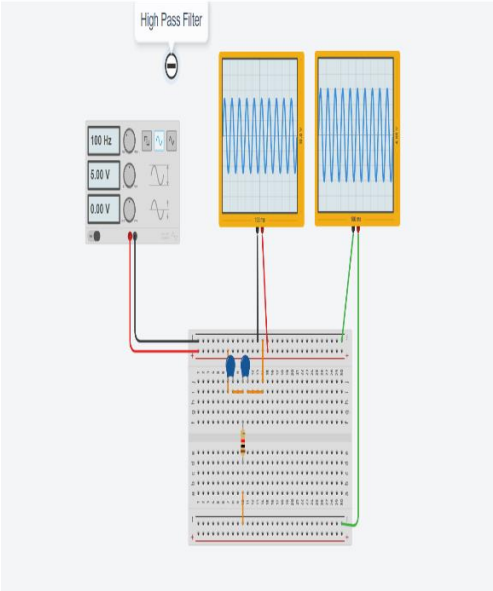
- One probe (Channel 1) to the input signal (across the capacitor).
- Another probe (Channel 2) to the output signal (across the resistor).

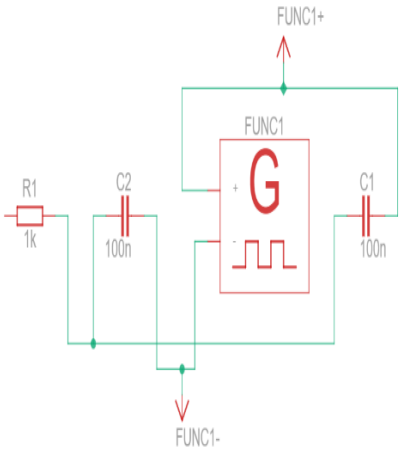
Set Function Generator Parameters:

- Configure the function generator to produce a sinusoidal signal.
- Set the frequency range (e.g., 10 Hz to 10 kHz) to observe how the filter behaves at different frequencies.
- Adjust the amplitude to a suitable level (e.g., 1 V peak-to-peak).

Simulate and Observe:

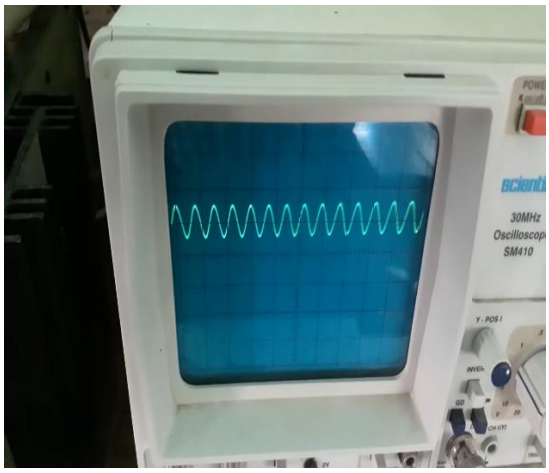
- Start the simulation.
- Use the oscilloscope to observe the input and output signals.
- Compare the amplitude of the output signal at different frequencies to see the high-pass filter in action.

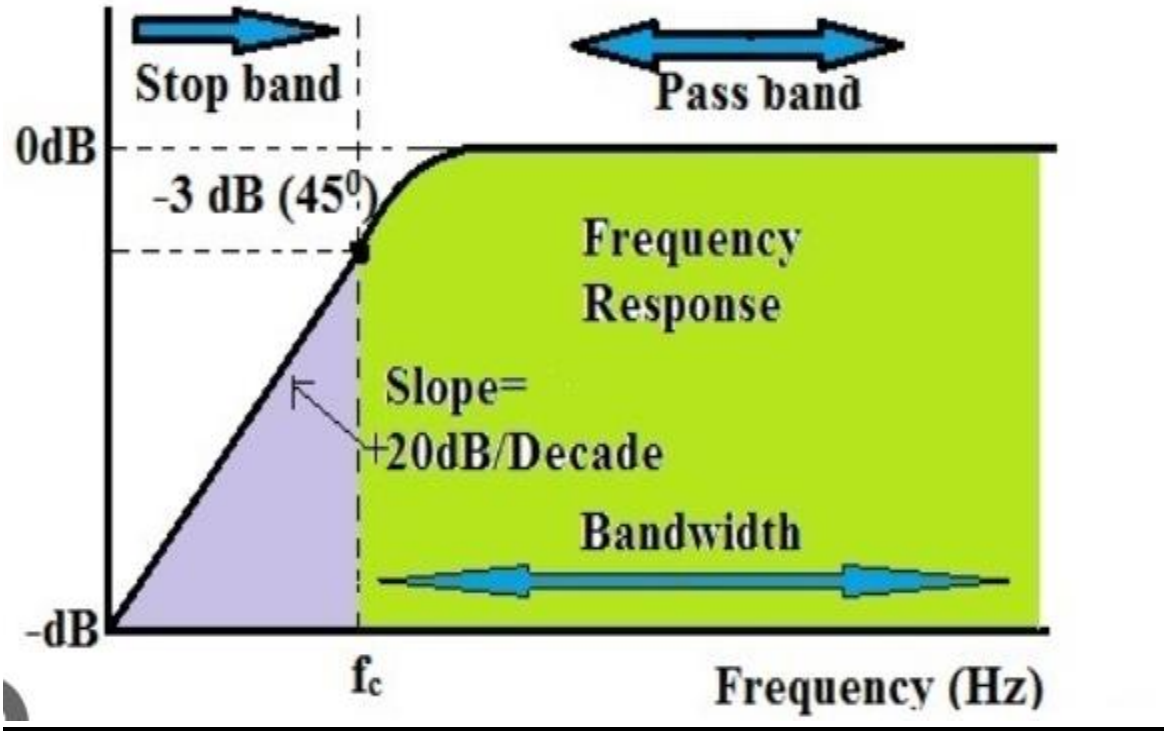




Name	Quantity	Component
C1 C2	2	100 nF Capacitor
R1	1	1 kΩ Resistor
FUNC1	1	100 Hz, 5 V, 0 V, Sine Function Generator
U1 U2	2	10 ms Oscilloscope

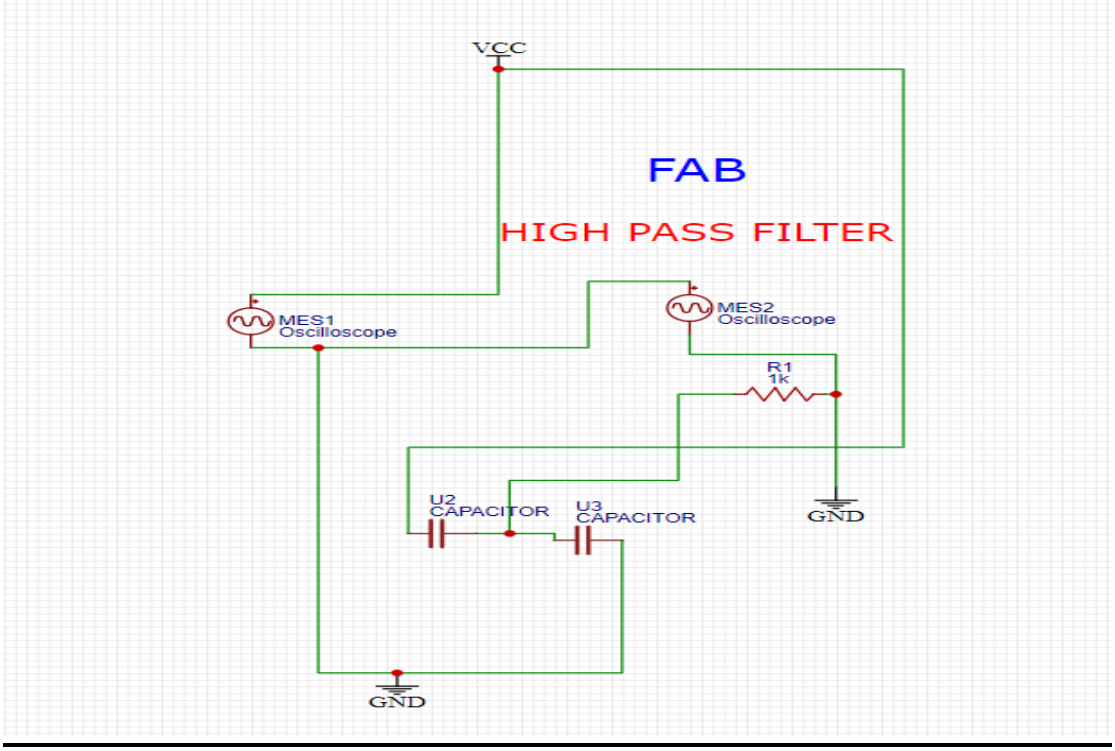
HARDWARE RESULTS:



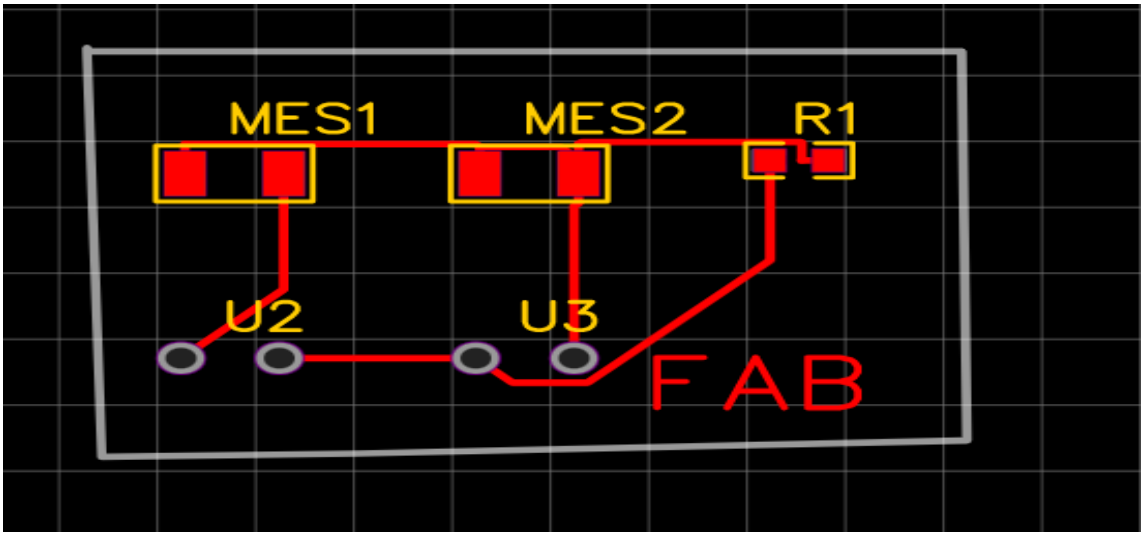


EasyEDA:

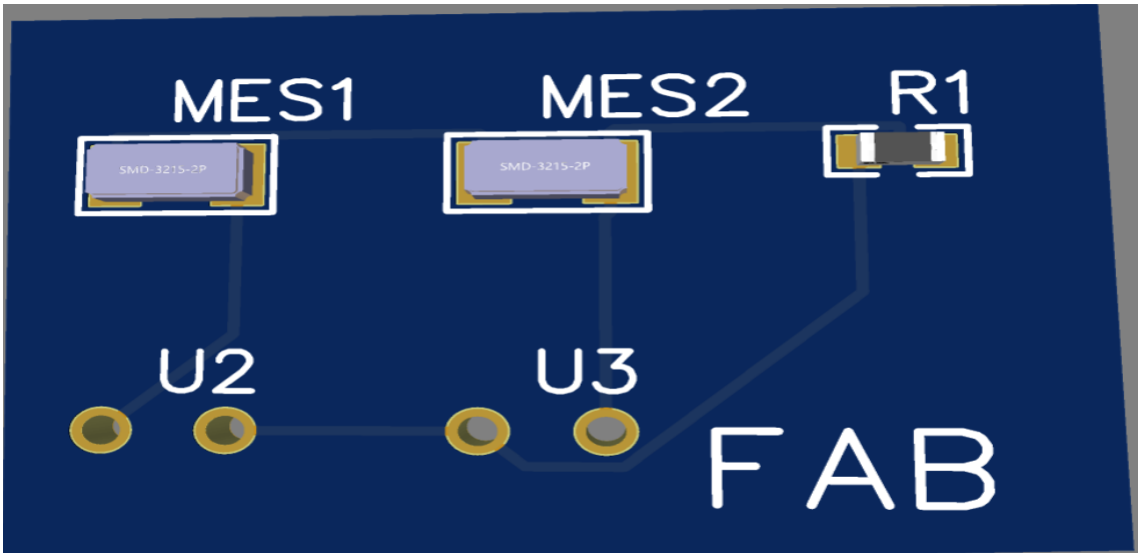
CIRCUIT DIAGRAM:



PCB DESIGN:



2D VEIW:



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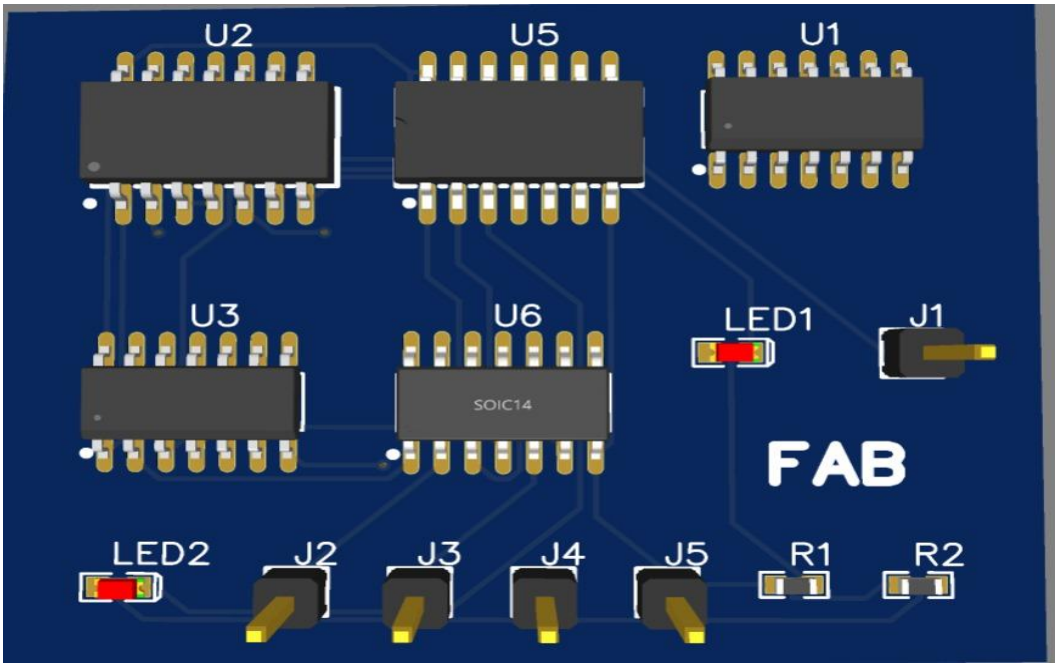

APPENDIX:

In this workshop, we explored the design and simulation of a high-pass filter using various tools. We started by designing a high-pass filter circuit in Tinker cad, where we simulated the circuit to observe its behavior and validate its performance. Next, we replicated the high-pass filter design in EasyEDA software and simulated the circuit to ensure consistent performance with the Tinker cad simulation. Finally, we used EasyEDA to create a printed circuit board (PCB) layout for the high-pass filter, preparing the design for fabrication. This hands-on experience provided a comprehensive understanding of electronic design automation (EDA) tools and the process of designing, simulating, and fabricating a high-pass filter circuit.