

ANALOG CIRCUIT Design

**Ain Shams University
Faculty of Engineering
ECE Program**



**ECE313: Analog Circuit 2
Spring 2024**

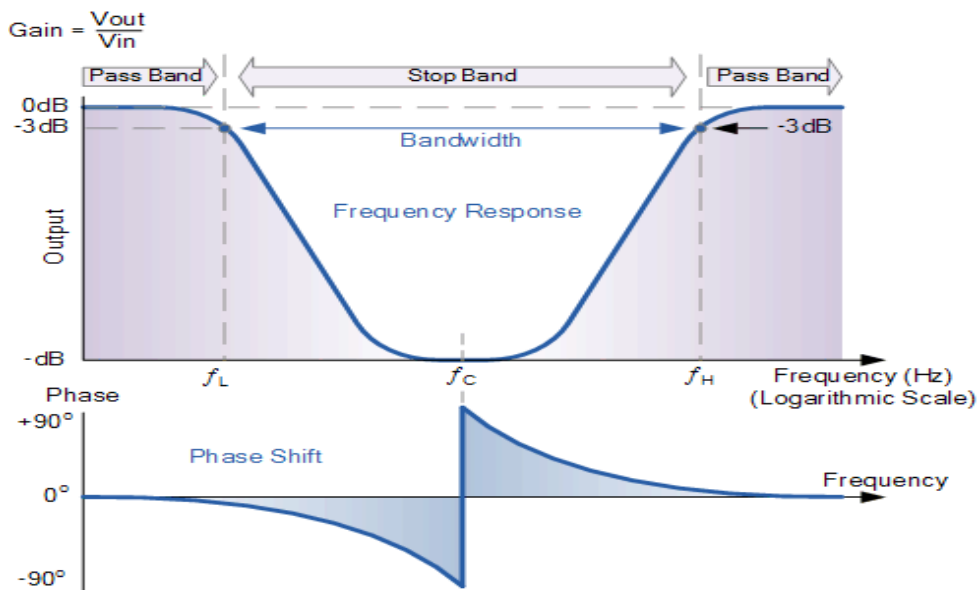
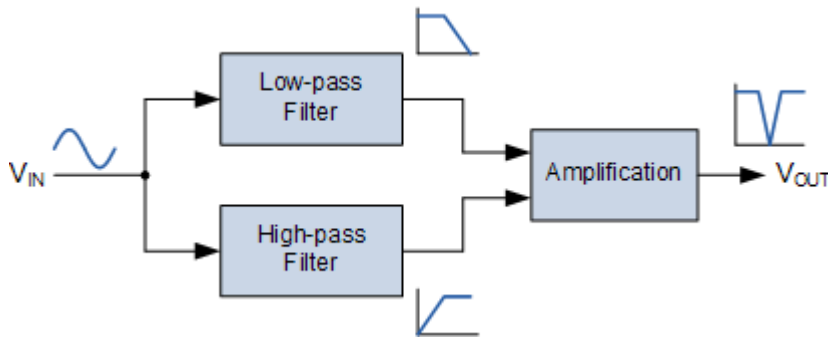
The project report

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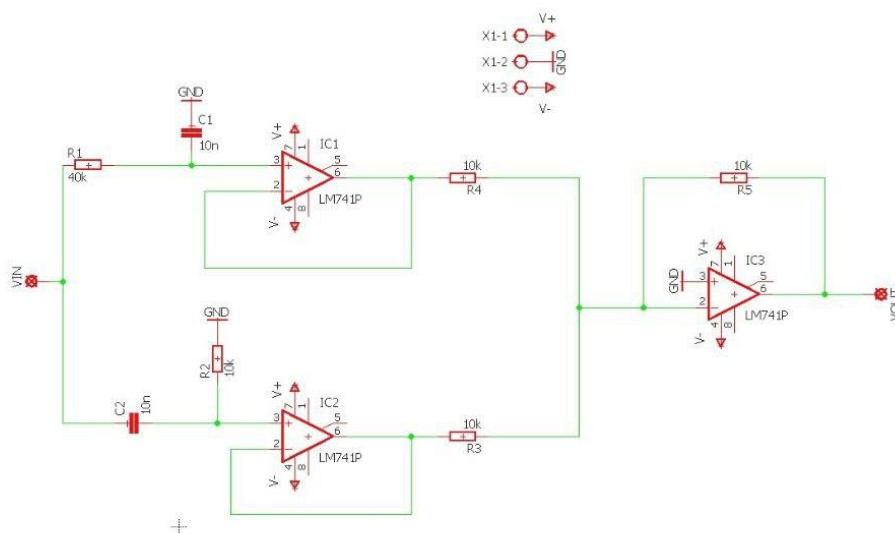
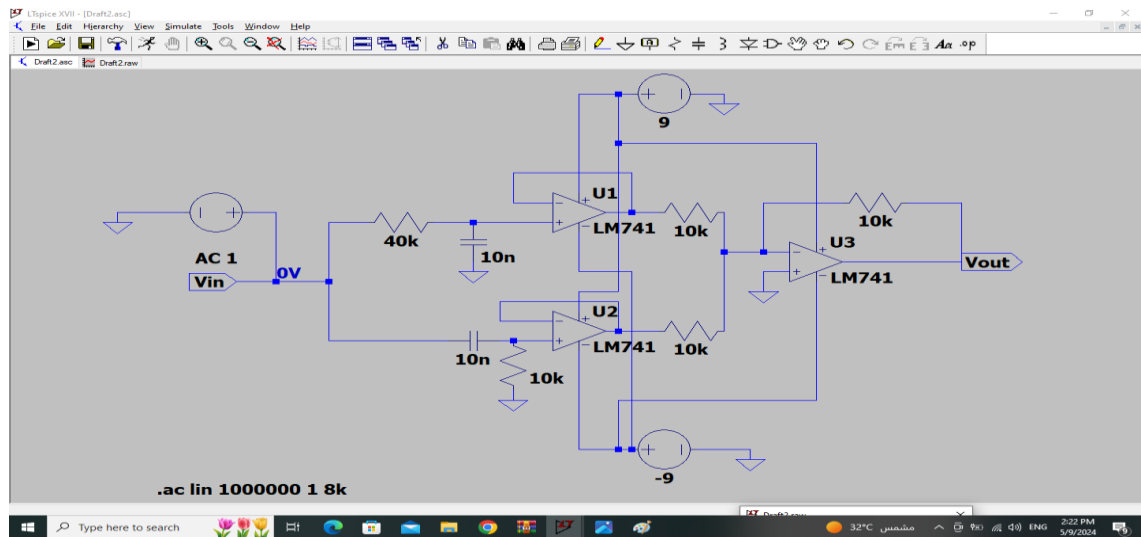
((ACTIVE STOP BAND FILTER))

Theoretical background:

It uses op-amps to make low pass filter and high pass filter together to attenuate a specific range of frequencies within a signal (the range of frequencies between the two cutoffs) while allowing other frequencies to pass through unaltered (all other frequencies).

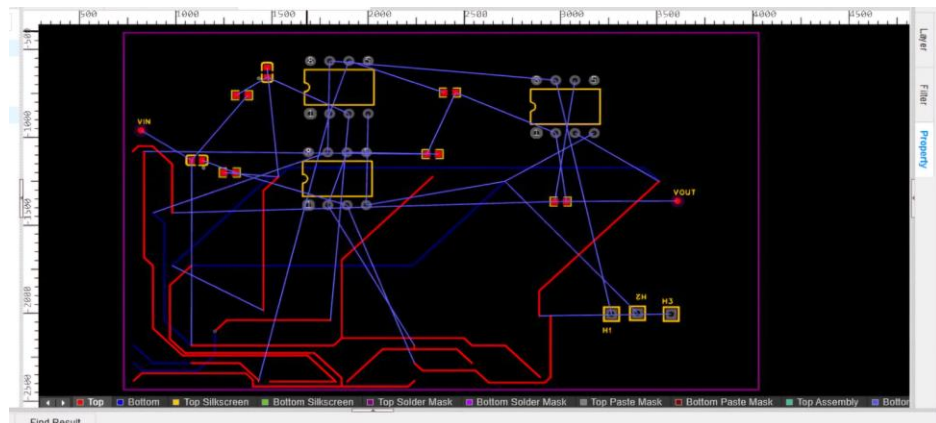


The schematic :

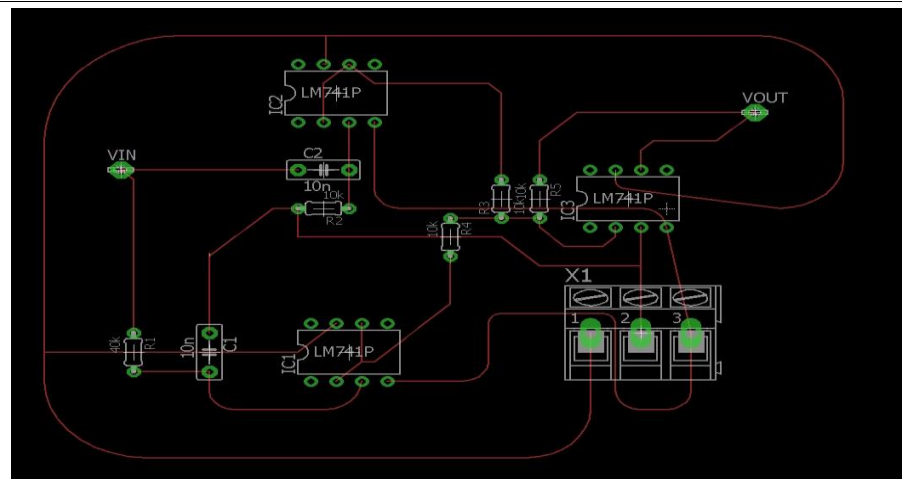


The layout:

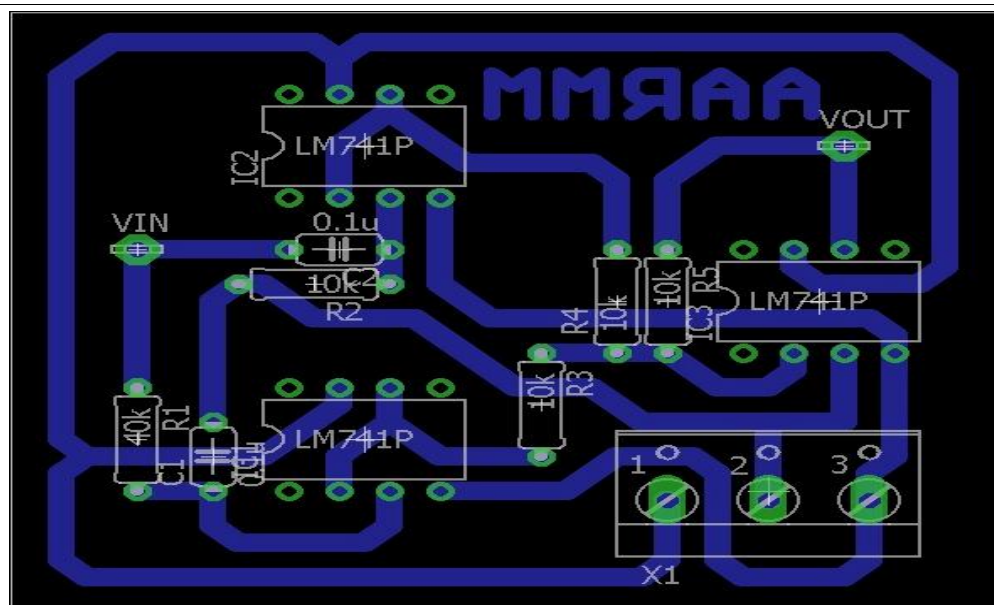
The first try



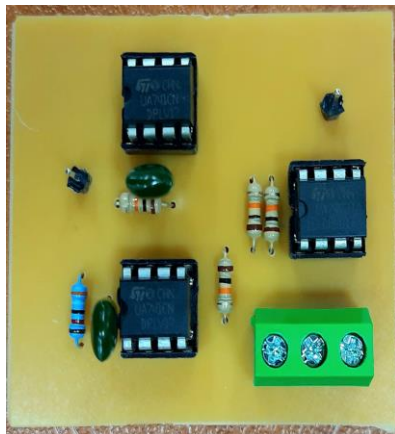
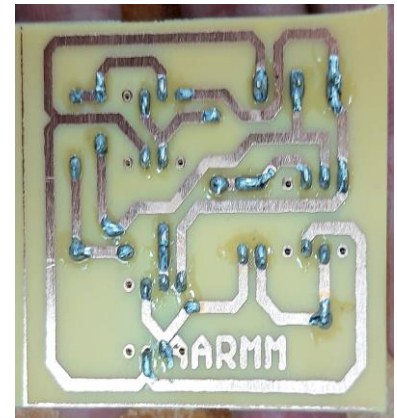
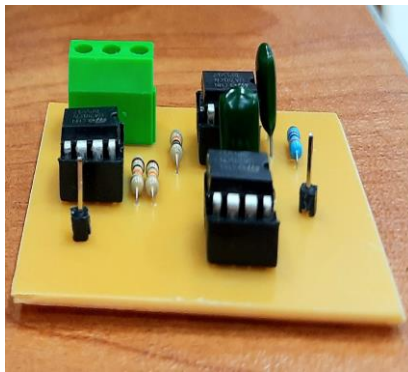
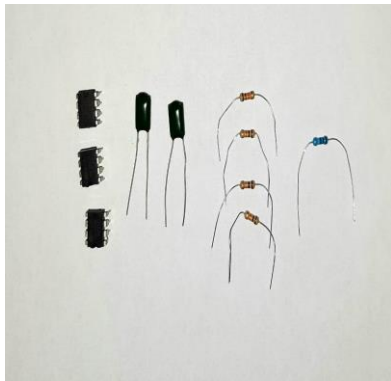
The last try
by taking a
printed
circuit as
reference



The
industry
layout



The components and the PCB:



Project Analysis

For Low Pass filter

$$F_{CL} = 400 \text{ Hz} \quad \text{Let } C = 10 \text{ nF}$$

$$F_{CL} = \frac{1}{2\pi R_L C} \rightarrow R_L = 40 \text{ k}\Omega$$

For High pass filter

$$F_{CH} = 1600 \text{ Hz} \quad \text{also } C = 10 \text{ nF}$$

$$F_{CH} = \frac{1}{2\pi R_H C} \rightarrow R_H = 10 \text{ k}\Omega$$

$F_c = \sqrt{F_{CL} \times F_{CH}}$
 \rightarrow geometric center frequency

$$F_c = \sqrt{400 \times 1600} = 800 \text{ Hz}$$

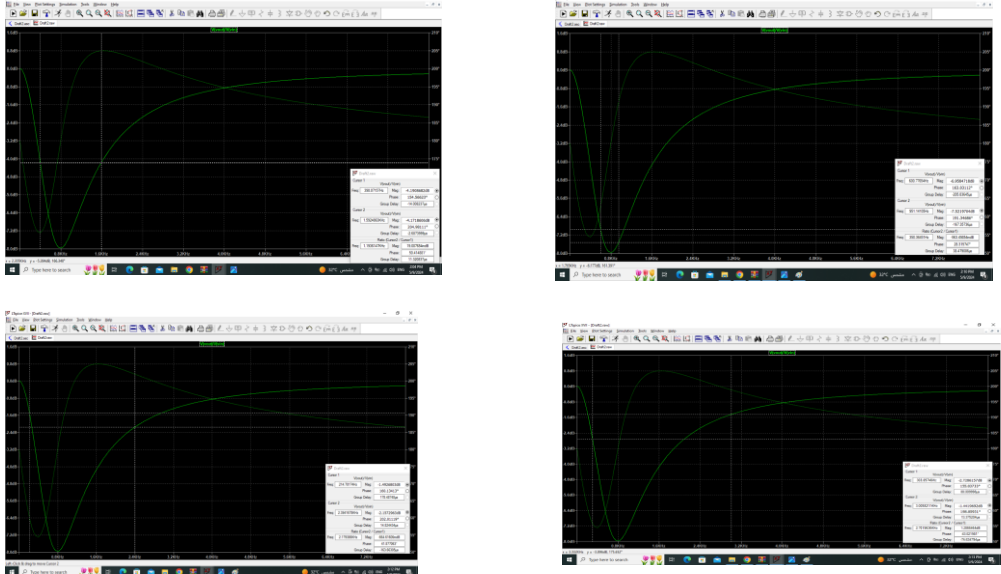
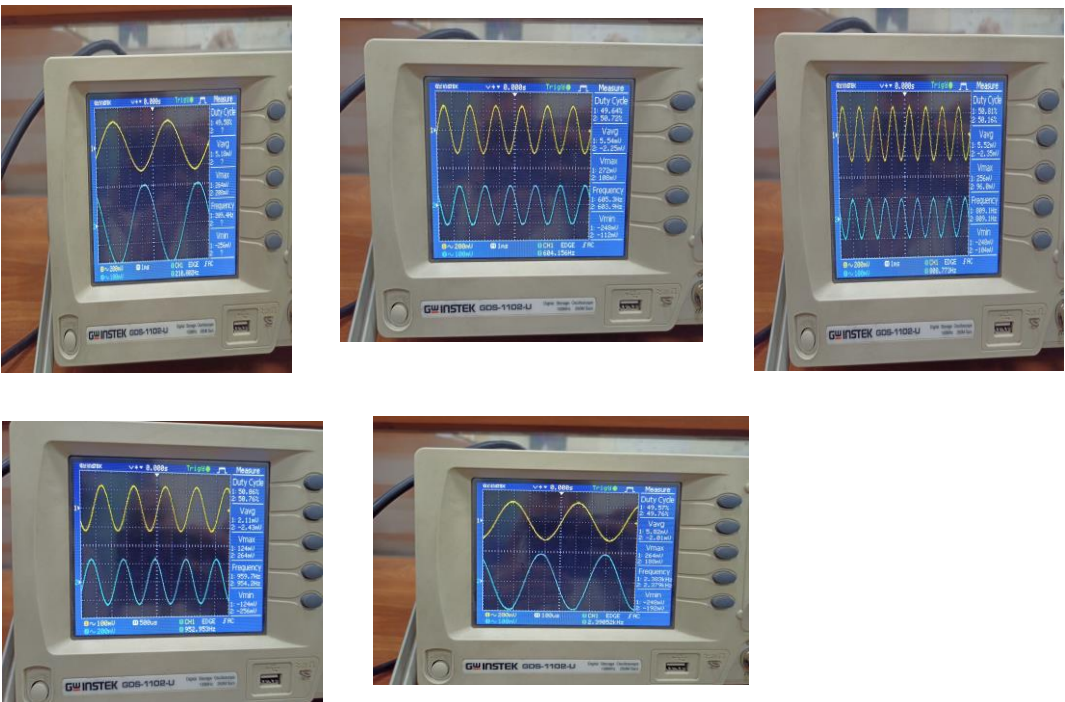
$$F_{BW} = 1600 - 400 = 1200 \text{ Hz}$$

$$Q = \frac{F_c}{F_{BW}} = \frac{800}{1200} = 0.667 = -3.5 \text{ dB}$$

at $F = 800 \text{ Hz} \rightarrow \frac{V_{out}}{V_{in}}$ from simulator equals -8 dB

$\frac{V_{out}}{V_{in}}$ from practical exp equals $\frac{96}{256} = -8.5 \text{ dB}$

The measurements and simulations:

Simulations	
Measured	

As we see the input signal passes without any attenuation if its frequency is before 400HZ (F_{cL}) and if exceeded it it starts to attenuates till reaching 1600HZ (F_{cH}) it starts to increase again till it returns to its initial form and passes without any attenuation