Electronics Design Principles

Oscillators

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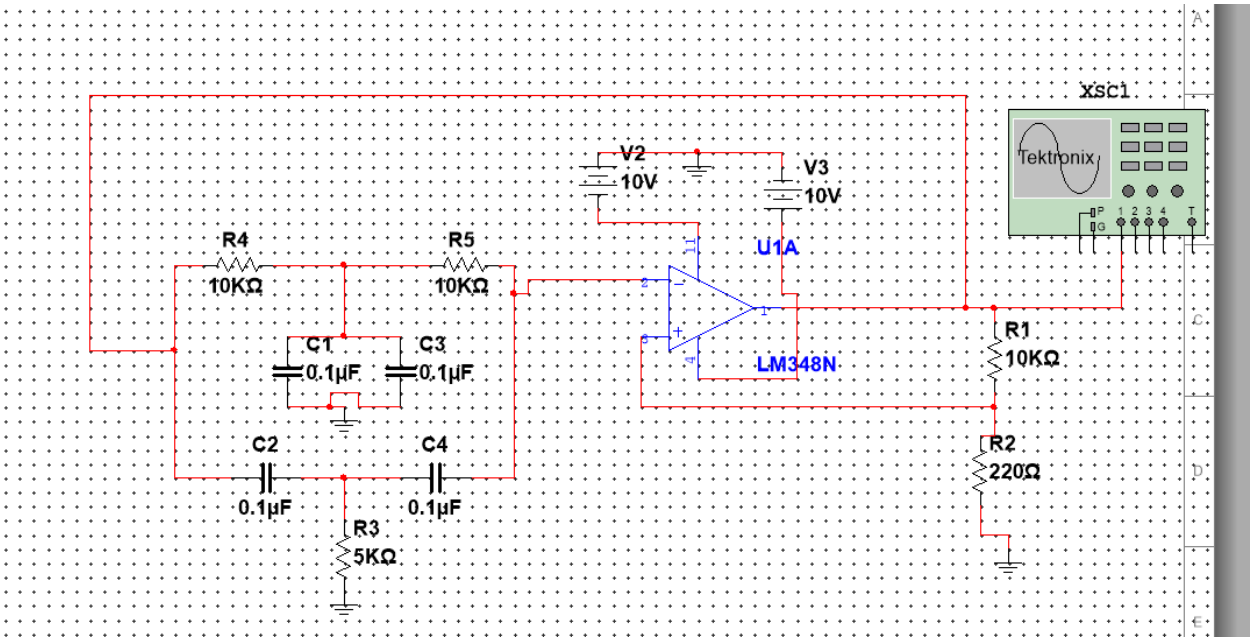
Object: Design and build an Oscillators using one of the designs that are given in the theory class (Lesson 8).

Please keep in mind that you need to need to build your circuit on the breadboard.

Equipment: Oscilloscope, power supply, capacitors, resistors, LM348M op amp, wires, breadboard.

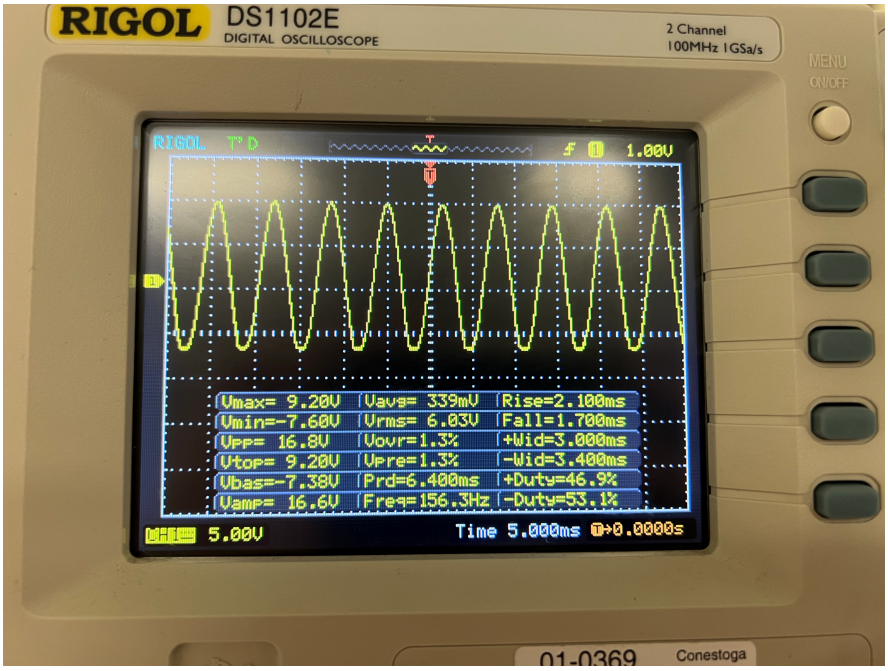
Schematic:



Output:

Case 1:
R = 10K
C = 0.1uF

Real Values

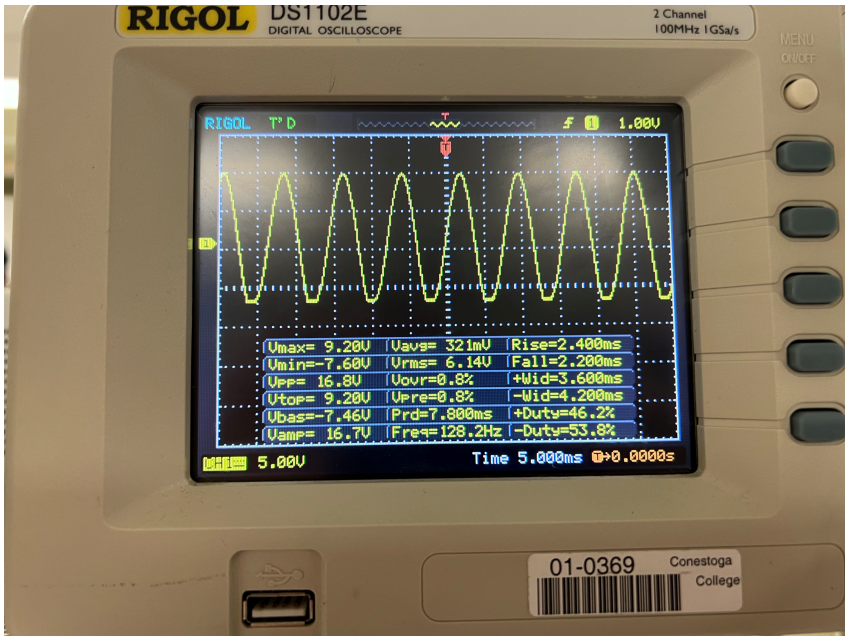


Type	CH1
Freq	156.3Hz
Period	6.400ms
V_{pp}	16.8V

Multisim Value

Type	CH1
Freq	158Hz
Period	6.33ms
Pk-Pk	16.0V

Case 2:
R = 12K
C = 0.1uF



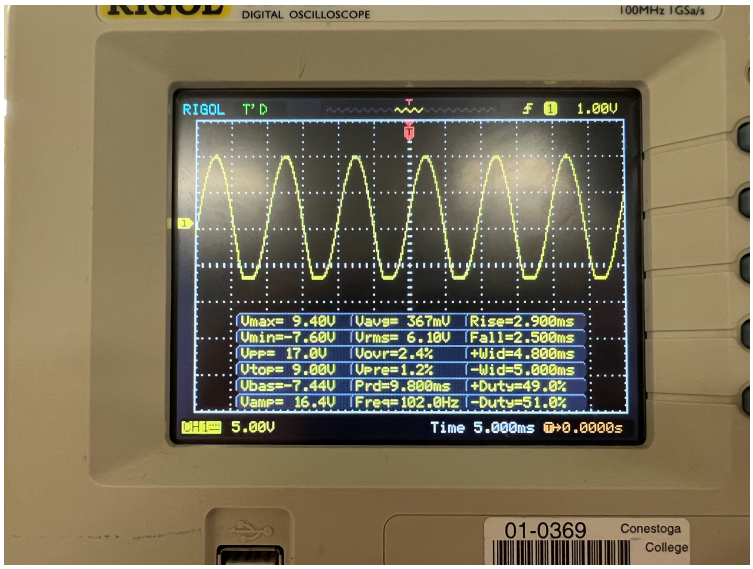
Real Value

Type	CH1
Freq	128.2Hz
Period	7.800ms
V_{pp}	16.8V

Multisim Value

Type	CH1
Freq	131Hz
Period	7.59ms
Pk-Pk	16.1V

Case 3:
R = 15K
C = 0.1uF



Real Value

Type	CH1
Freq	102.0Hz
Period	9.800ms
V_{pp}	17.0V

Multisim Value

Type	CH1
Freq	105Hz
Period	9.48ms
Pk-Pk	16.1V

Input:

Case 1:
- R = 10K
- C = 0.1uF

Case 2:
- R = 12K
- C = 0.1uF

Case 3:
- R = 15K
- C = 0.1uF

Observations:

From the observation we can see that the frequency depends upon the resistors and the capacitors in the low pass filter and the high pass filter.

Calculations:

Case 1:

f = 1/2(pi)RC
f = 1/2 * (pi) * 10000 * 0.0000001
f = 1/0.00628318530717958647692528676656
f = 159.154943

Case 2:

f = 1/2(pi)RC
f = 1/2 * (pi) * 12000 * 0.0000001
f = 1/0.00753982236861550377231034411987
f = 132.629119

Case 3:

f = 1/2(pi)RC
f = 1/2 * (pi) * 15000 * 0.0000001
f = 1/0.00942477796076937971538793014984
f = 106.103295

Theory Vs Practical:

If we look at the values from multisim and the actual values from the oscilloscope we can see that the values we get are not totally exact has the values we get from the oscilloscope are smaller than that we received from multisim. Also the values we calculated using the formula provided in the theory lesson has a greater outcome than the values we receive from multisim.

Conclusions:

We can finally conclude that if we increase the resistors, capacitors value in the filter than we will decrease the frequency of the output signal and the opposite is also true. We call also conclude that the frequency only depends on the resistors and capacitor values in the low pass filter and the high pass filter, and not on the resistors connected to the positive terminal of the op-amp.