

# Electronics Design Principles

## Unregulated Power Supply

Name: Rajkaran Singh Grewal

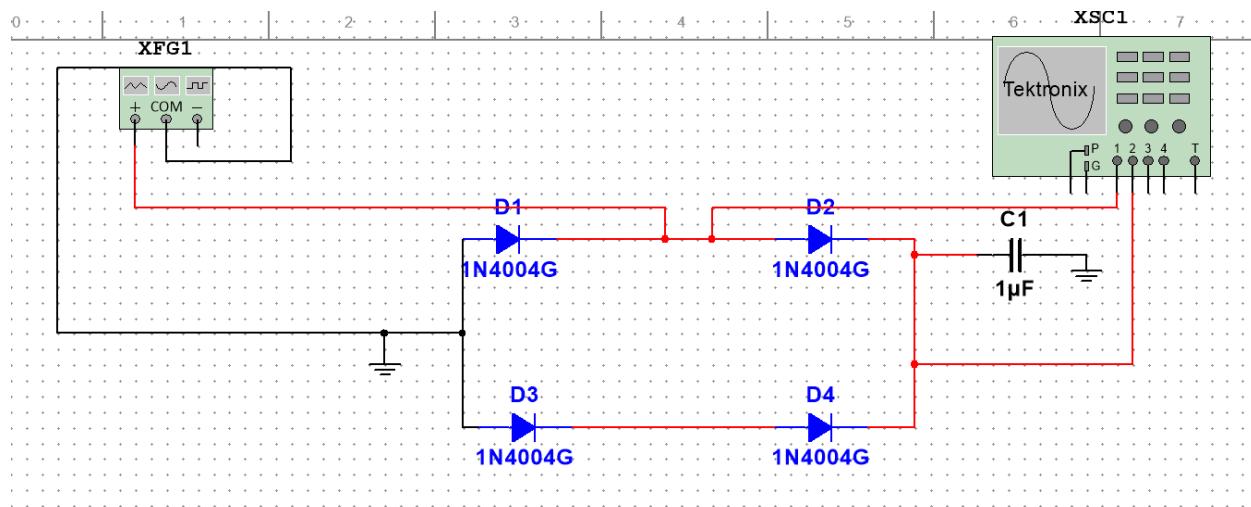
Student No: 8882386

Student Email: rgrewal2386@conestogac.on.ca

**Object:** Design and build an Unregulated Power Supply.

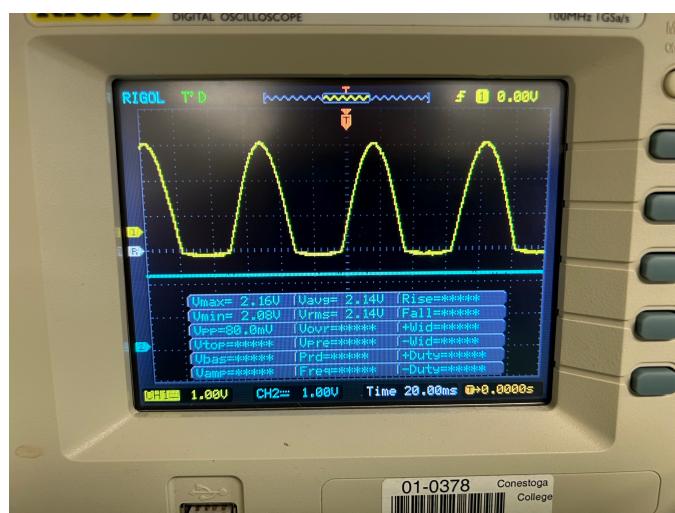
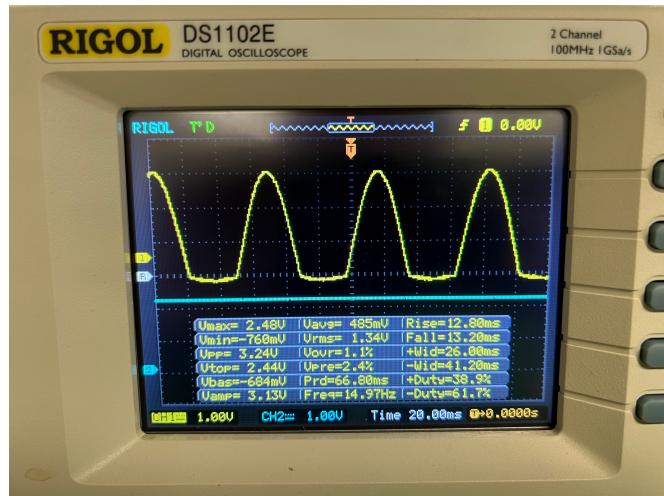
**Equipment:** Oscilloscope, function generator, capacitors, resistors, LM348M op amp, wires, breadboard.

**Schematic:**



**Output:**

Case 1:



### Real Values

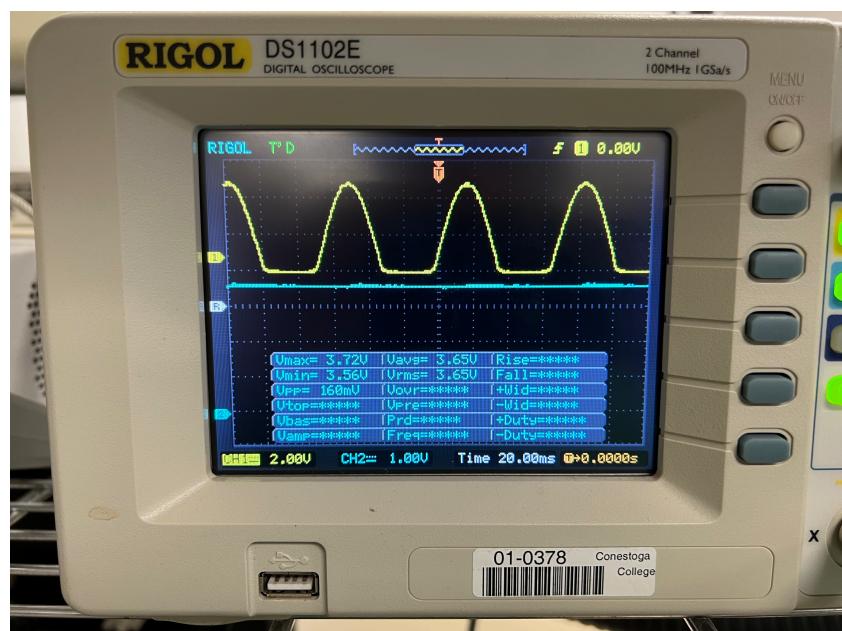
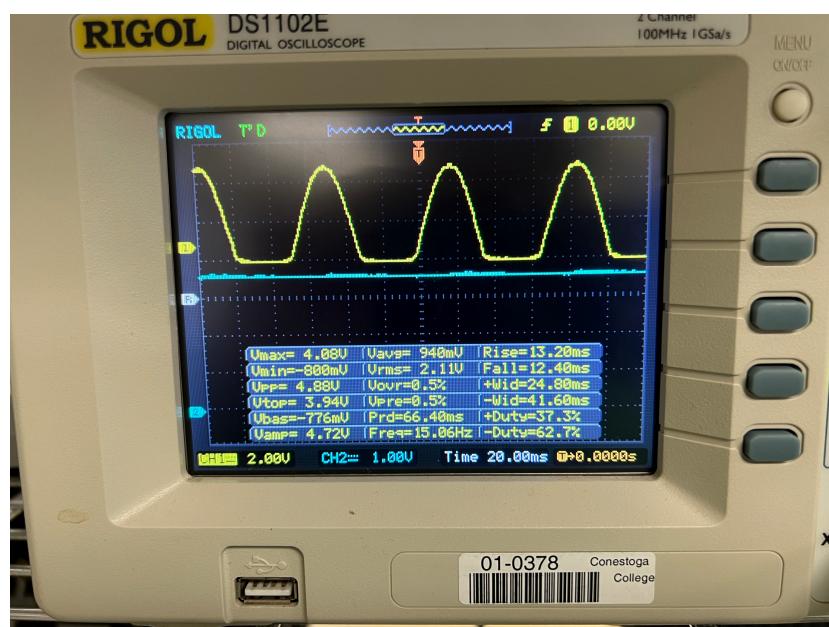
Type	CH1	CH2
V <sub>max</sub>	2.48V	2.16V
V <sub>min</sub>	-760mV	2.08V
V <sub>pp</sub>	3.24V	80mV

### Multisim Value

Type	CH1	CH2
V <sub>max</sub>	2.5V	-2.31V

Type	CH1	CH2
V <sub>min</sub>	-2.5V	2.31V
Pk-Pk	5V	6.11mV

Case 2:



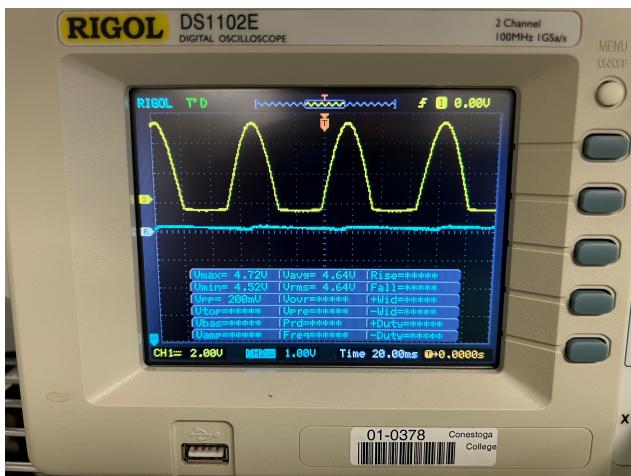
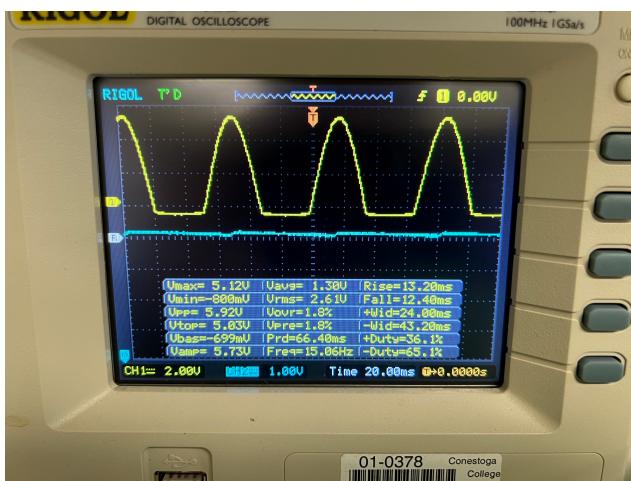
Real Value

Type	CH1	CH2
V <sub>max</sub>	4.08V	3.72V
V <sub>min</sub>	-800mV	3.56V
V <sub>pp</sub>	4.88V	160mV

Multisim Value

Type	CH1	CH2
V <sub>max</sub>	4V	3.81V
V <sub>min</sub>	-4V	3.8V
V <sub>pp</sub>	8V	6.27mV

Case 3:



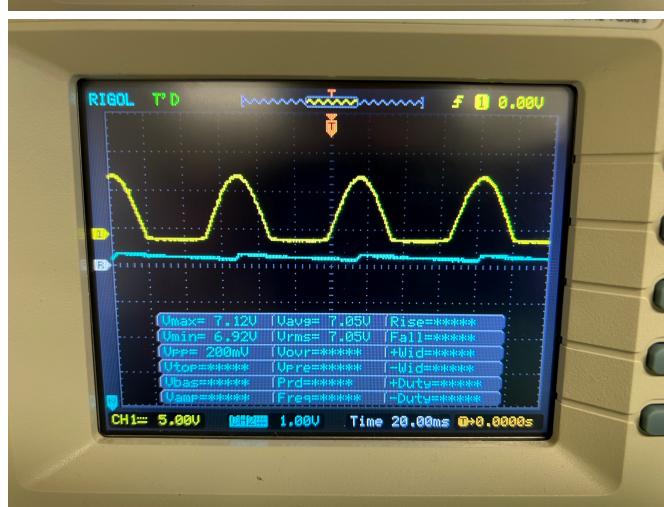
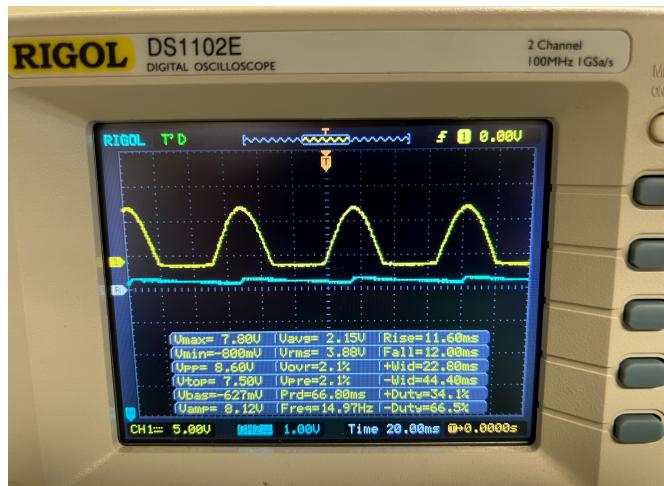
### Real Value

Type	CH1	CH2
V <sub>max</sub>	5.12V	4.72V
V <sub>min</sub>	-800mV	4.52V
V <sub>pp</sub>	5.92V	200mV

### Multisim Value

Type	CH1	CH2
V <sub>max</sub>	5V	4.8V
V <sub>min</sub>	-5V	4.79V
V <sub>pp</sub>	10V	7.85mV

### Case 4:



Real Value:

Type	CH1	CH2
$V_{max}$	7.80V	7.12V
$V_{min}$	-800mV	6.92V
$V_{pp}$	8.60V	200mV

Multisim:

Type	CH1	CH2
$V_{max}$	7.5V	7.3V
$V_{min}$	-7.5V	7.28V
$V_{pp}$	15V	10.52mV

## Input:

Case 1:

$$V = 5V$$

Case 2:

$$V = 8V$$

Case 3:

$$V = 10V$$

Case 4:

$$V = 15V$$

## Observations:

From the observation we can see that the DC Voltage output is a little less than the input AC voltage supplied. Also we can see in the real world when we observe the Input voltage we get only the single direction of the AC voltage and the negative voltage of the AC voltage is not observable in the oscilloscope, however it is observable in multisim.

## Theory Vs Practical:

If we look at the values from multisim and the actual values from the oscilloscope we can see that the DC voltage output the  $V_{max}$  and  $V_{min}$  are closer together thus having a smaller  $V_{pp}$  value, while the real world readings are further apart. We can also see that the negative Voltage of the input is not observable in real world however it is observable in multisim.

## Conclusions:

We can finally conclude that using a unregulated power supply is not a fully DC voltage as there is still a alternating voltage however the alternating can be reduced with a larger capacitor used in the circuit. We can also conclude that the unregulated power supply also clips the input voltage where the negative voltage is closer to 0V. I assume this is due to the diode not allowing the current to return back to the function generator.