



Faculty of Information Technology
Electrical and Computer Engineering Department
CIRCUITS AND ELECTRONICS LABORATORY (ENEE2103)

Prelab Experiment#6
“Diode Characteristic and Applications”

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Teacher: Eng. Mostafa Helal

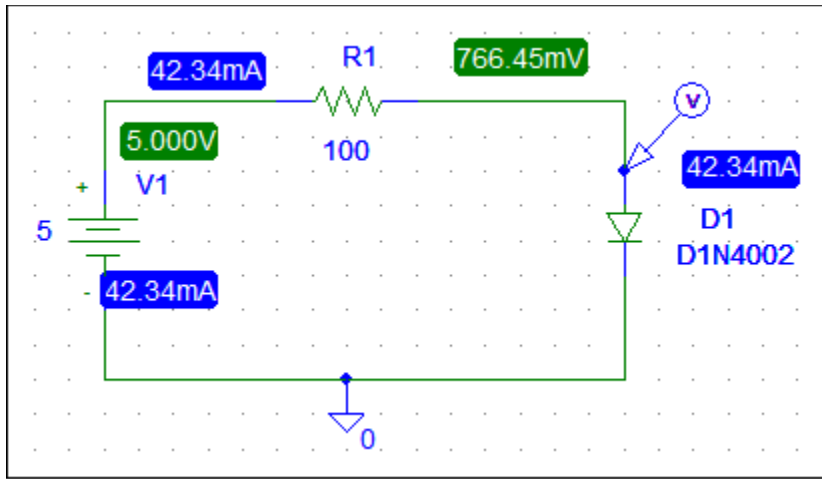
Student Name: Mays Sbaih

Student Number:1160006

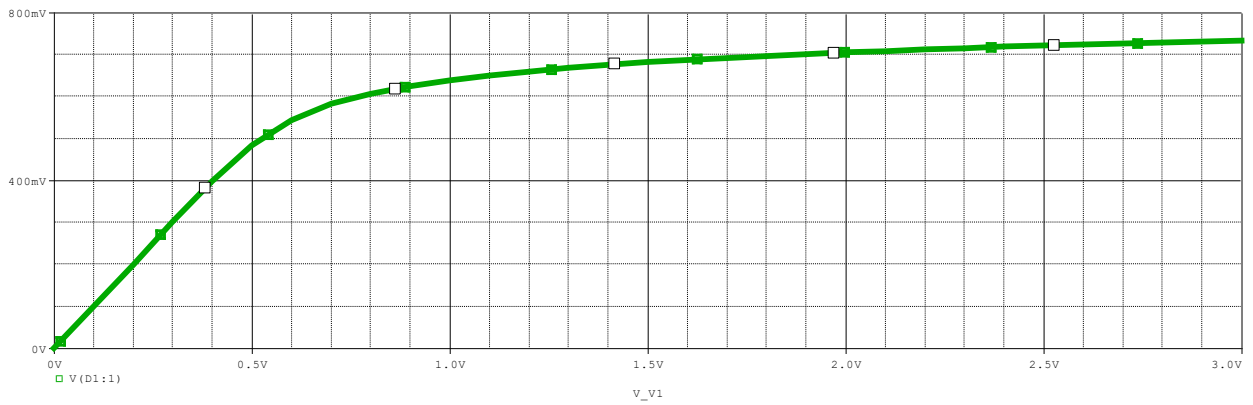
Section 3

Due to:18-3-2019

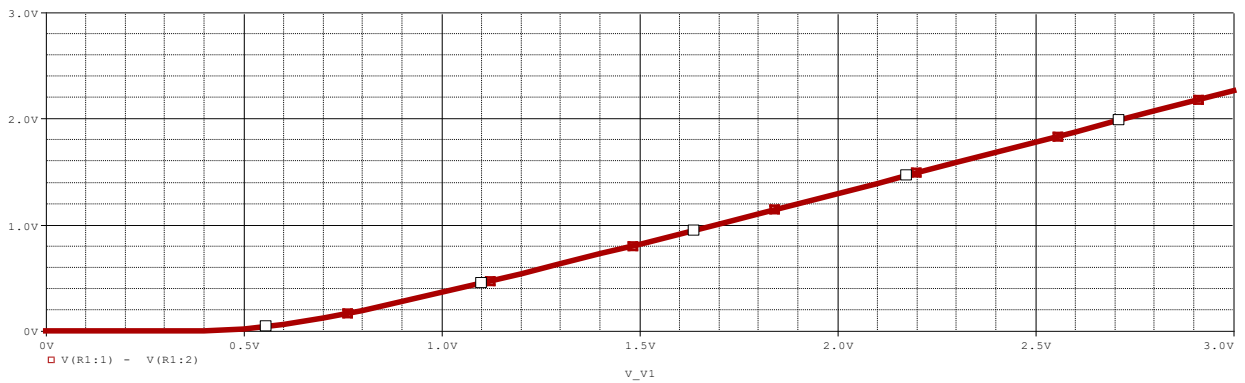
1. Diode Characteristics:



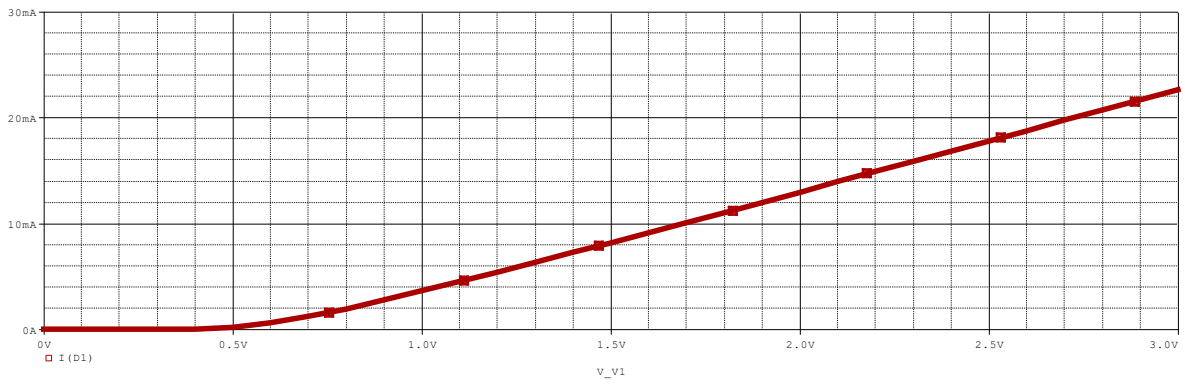
• V_D



• V_{R1}

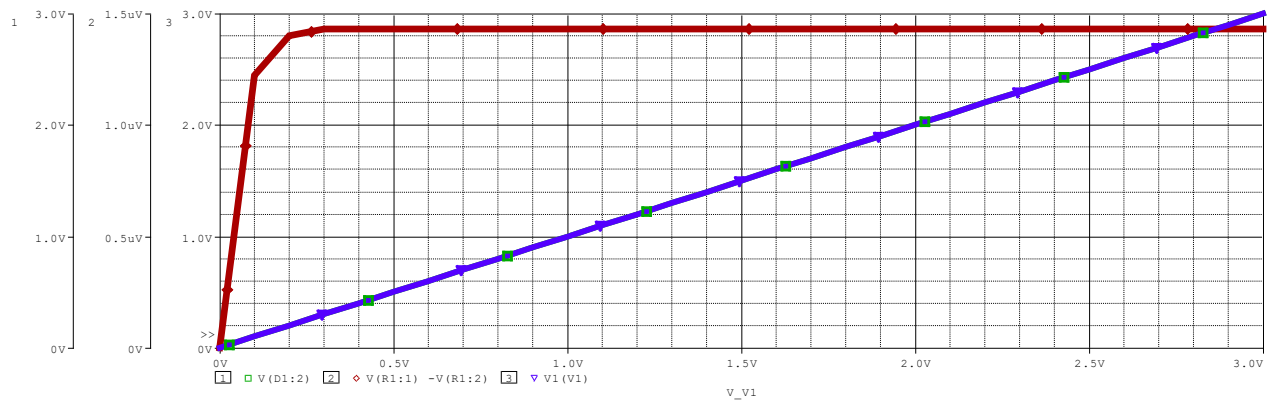


- I_D

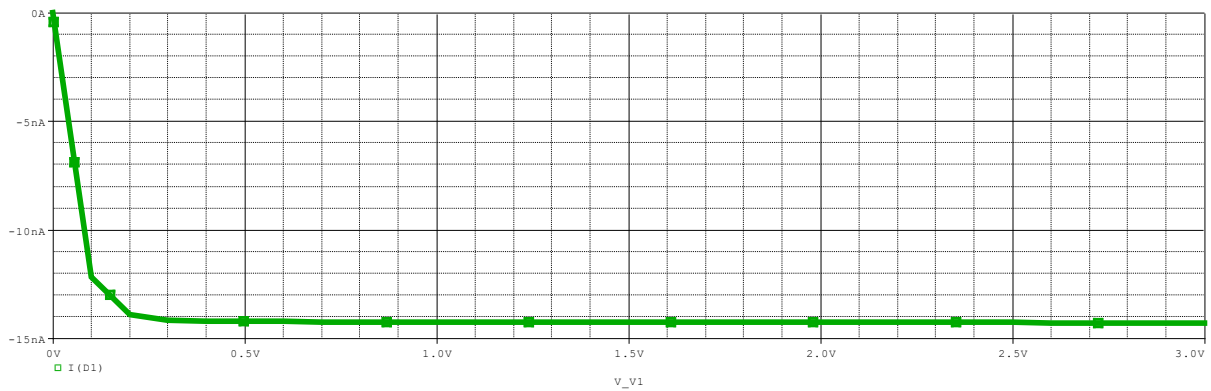


➤ When diode is reversed:

- V_D, V_{R1}, V_1



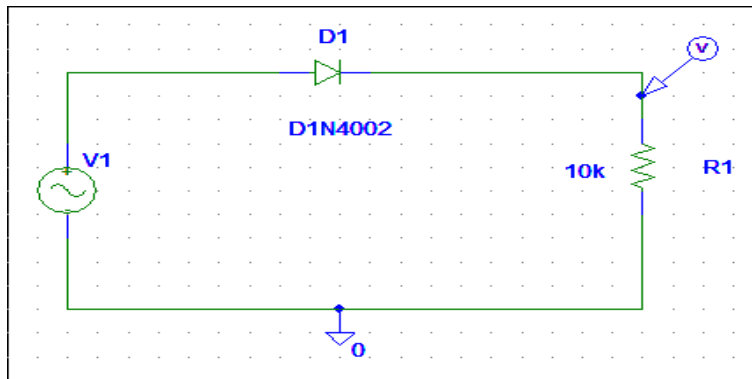
- I_D



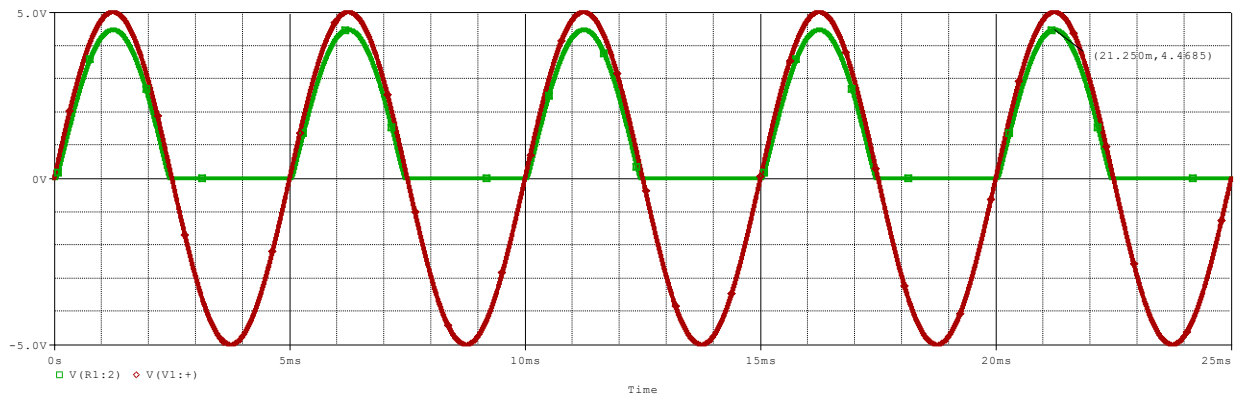
✓ When diode is reversed its voltage will always equal the input voltage since it is open.

2. RECTIFICATION.

A. HALF - WAVE RECTIFICATION.

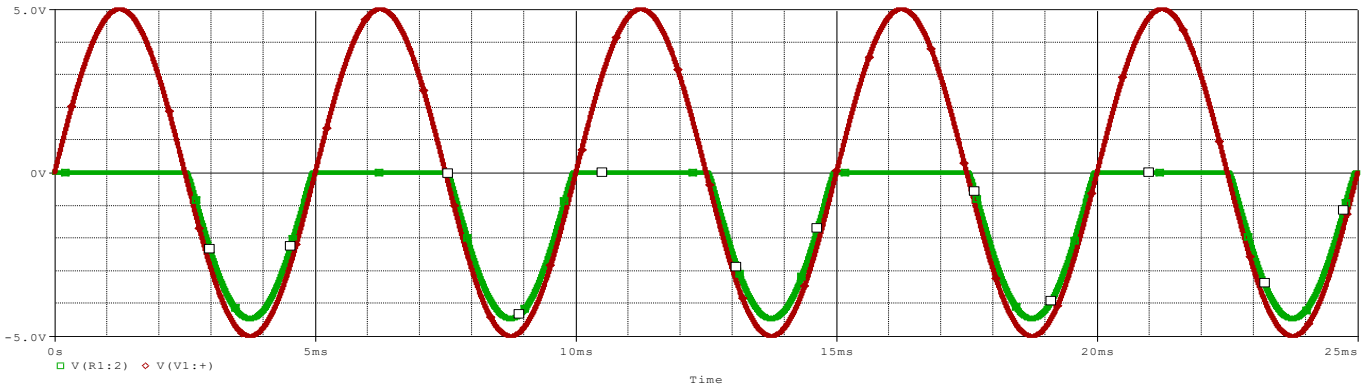


- Vout

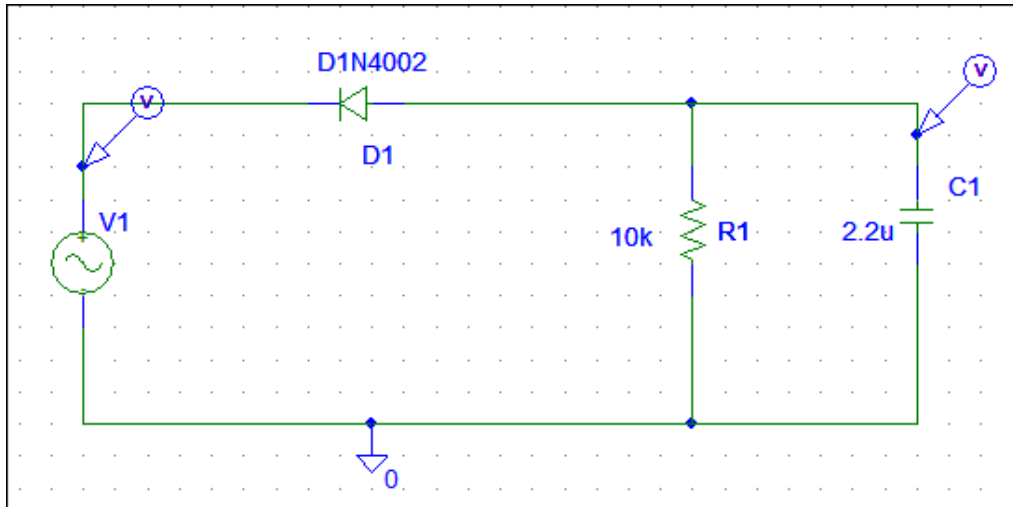


- T period = $1/200 = 5\text{ms}$.
- V pk = 4.4685 volt.
- VDC = $V_{\text{pk}} / \pi = 1.4224$ volt.

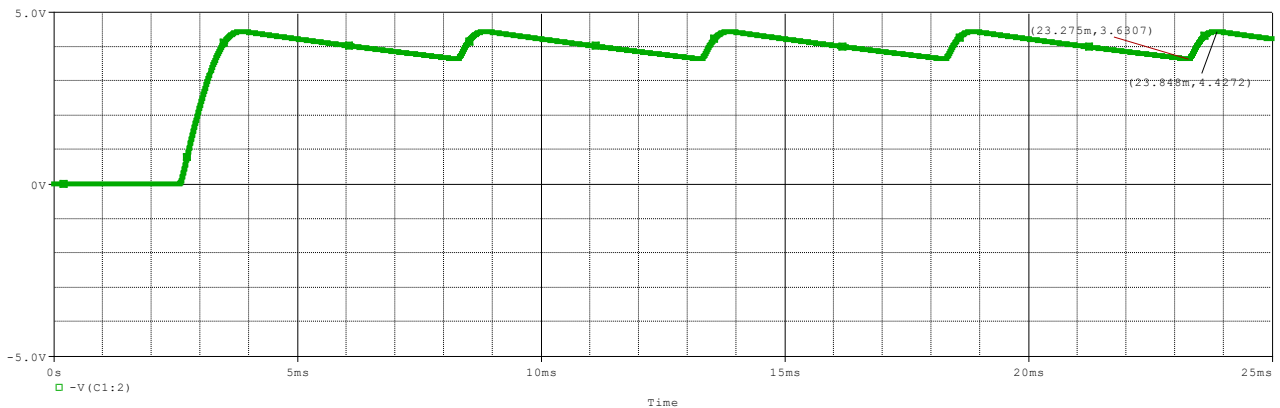
➤ We can obtain a negative voltage by reversing the diode as shown below:



➤ When adding a capacitor of $2.2\mu\text{F}$ to the circuit:



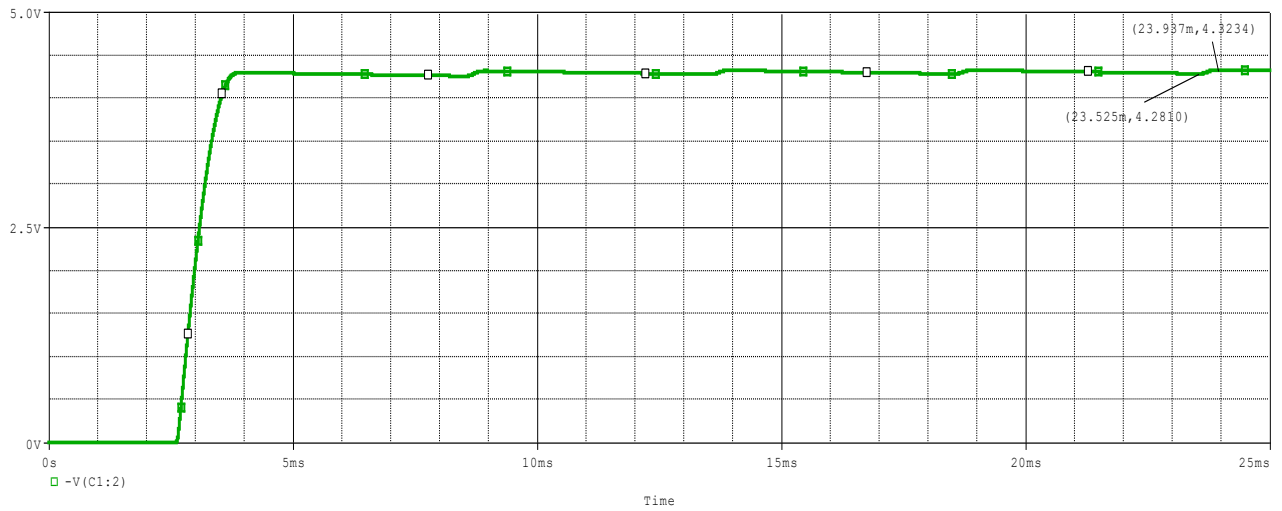
• Vout



○ $V_{p-p} = 4.4272 - 3.6307 = 0.7965$ volt.

○ Mean value = $V_m - \frac{1}{2} V_{p-p} = 4.4272 - 0.39825 = 4.03$ volt.

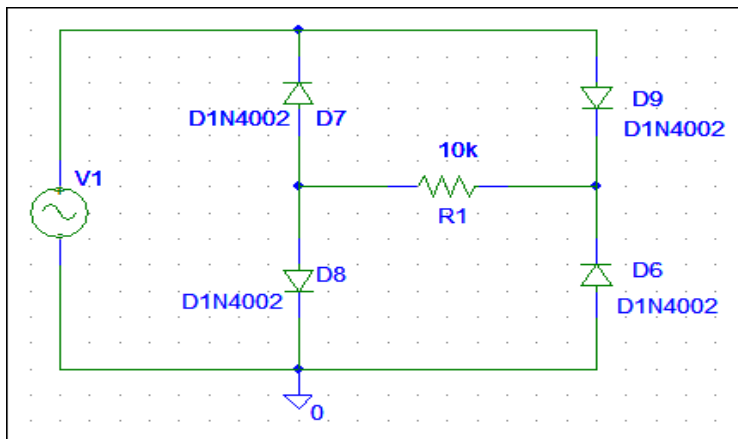
- When replacing the 2.2 μF capacitor by a much larger value of 47 μF :

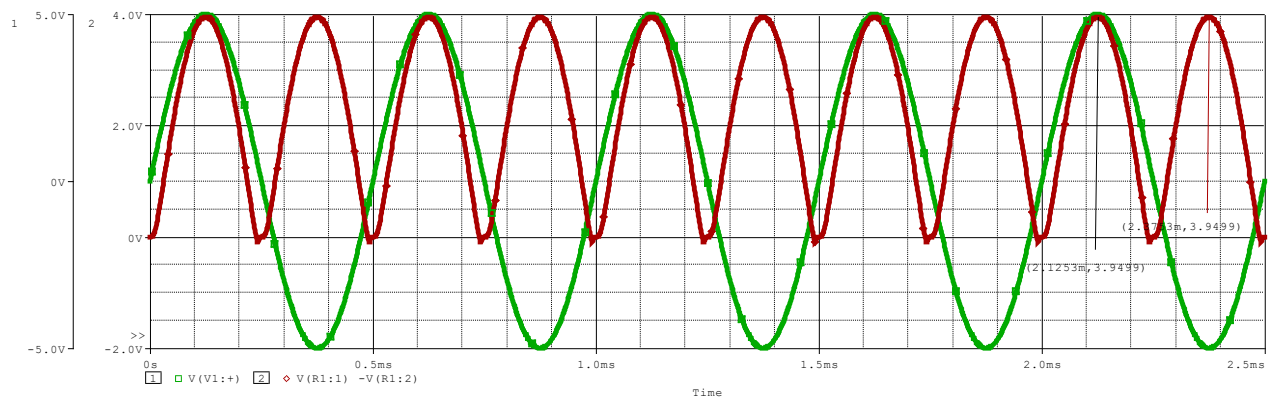


- $V_{p-p} = 4.3234 - 4.2810 = 0.0424$ volt.
- Mean value = $V_m - \frac{1}{2} V_{p-p} = 4.3234 - 0.0212 = 4.3022$ volt.
- ✓ With lower value of capacitor, ripple is less and mean value is greater.

B. FULL-WAVE RECTIFICATION

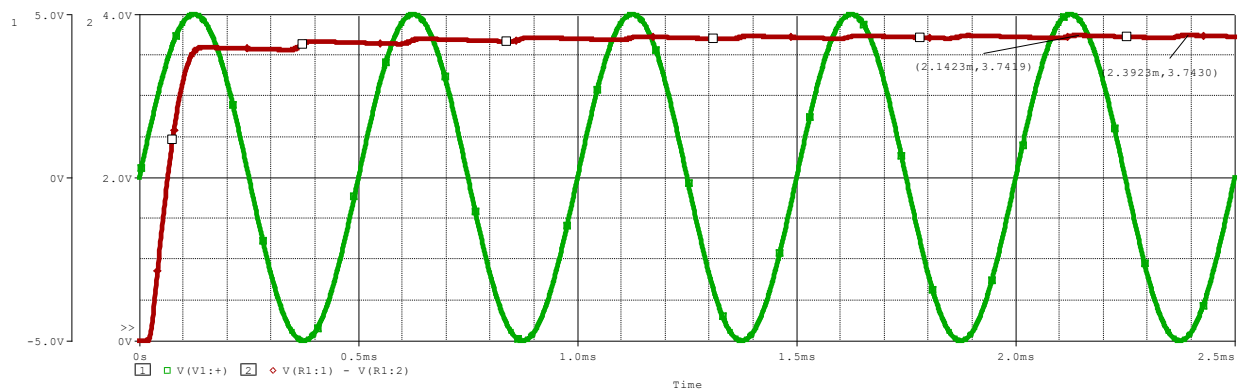
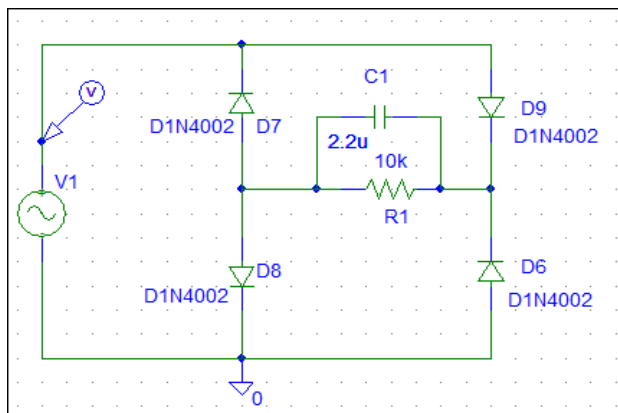
Diode bridge circuit as a full wave rectifier





- T period= 2.3753 – 2.1253 = 0.25ms
- V_{pk} = 3.9499 volt.
- VDC = 2V_{pk} / π = 2.5146 volt.

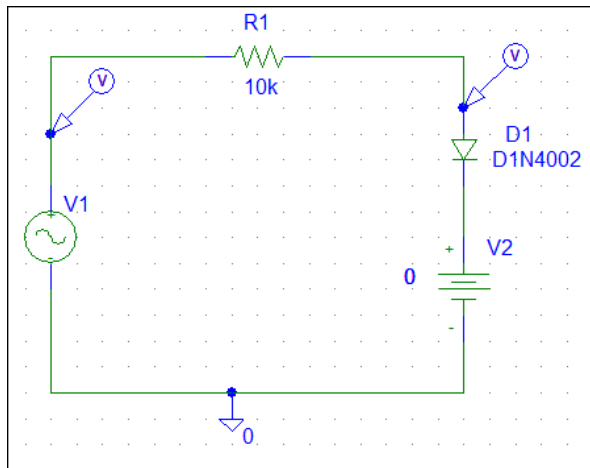
➤ When adding capacitor = 2.2 uF.



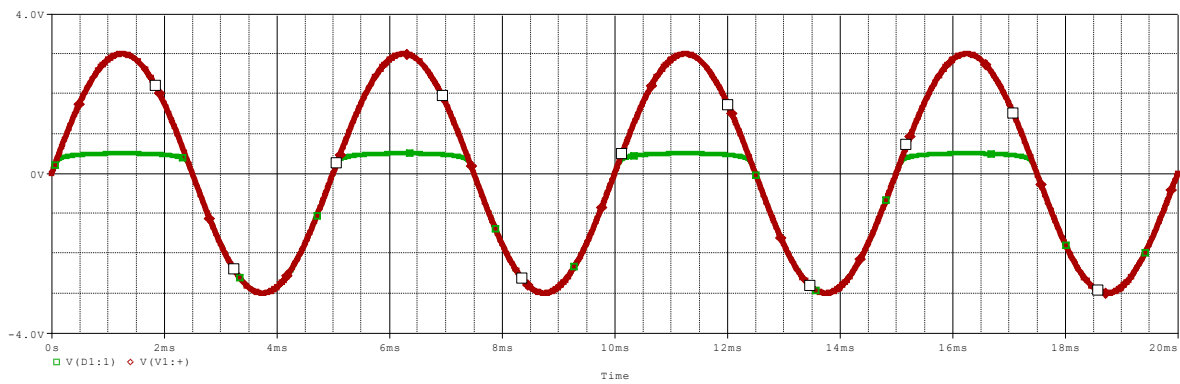
- Peak-to-peak voltage (V_{p-p}) = 3.743 – 3.7419 = ~ 0.0011 volt.
- Mean value = V_m – ½ V_{p-p} = 3.743 – 0.0011 = 3.7441 volt.

3. Other applications

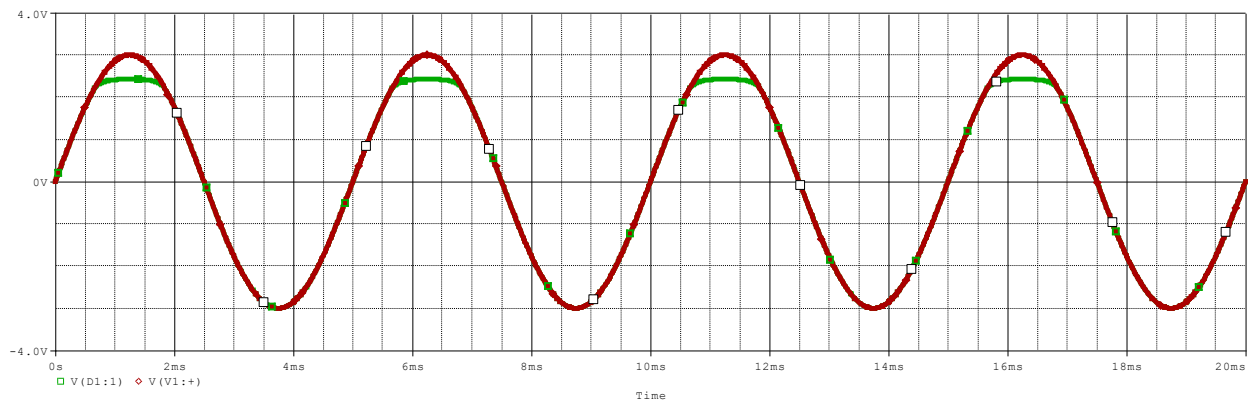
A. Clipping



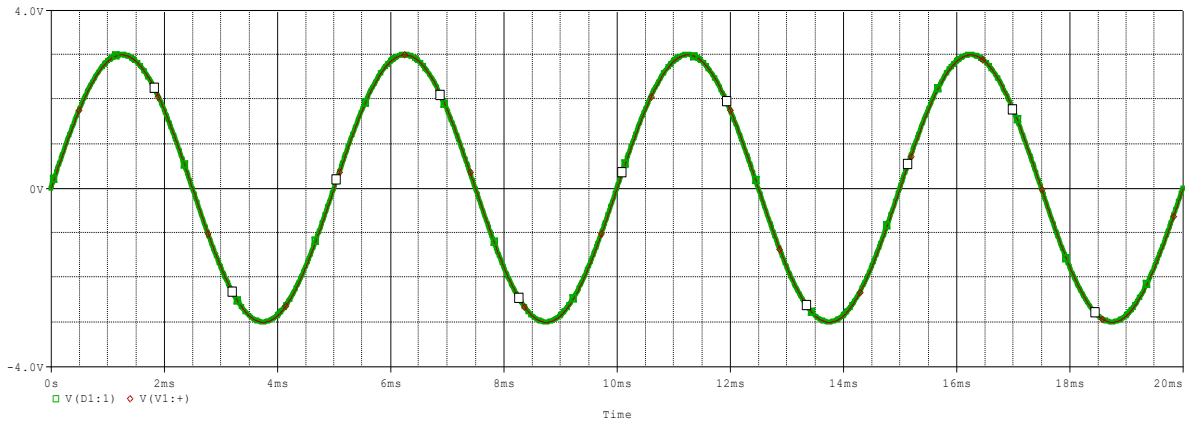
➤ When dc value equal 0V.



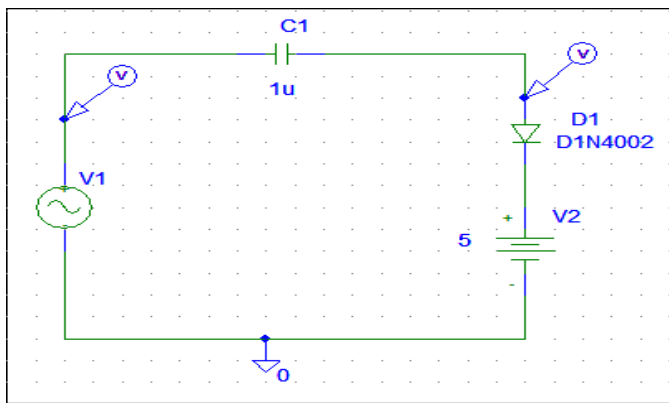
➤ When dc value equal 2V.



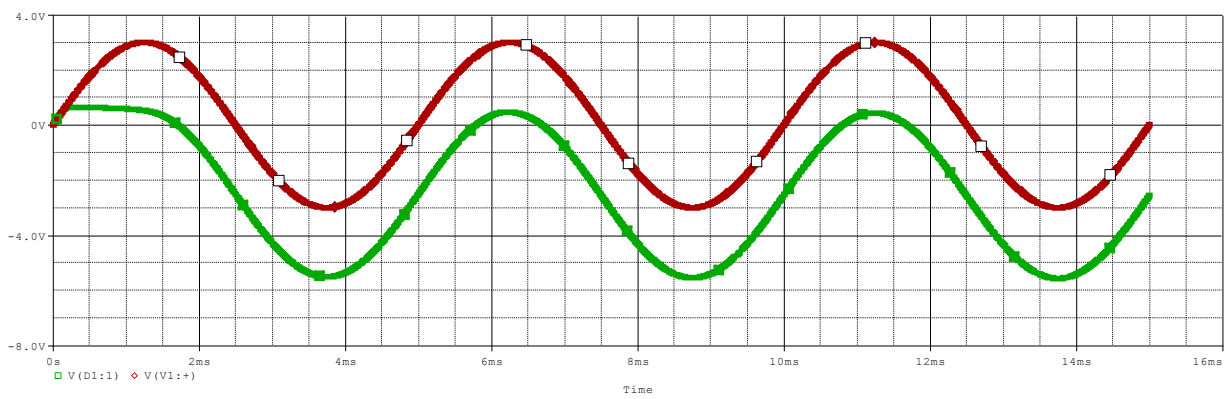
➤ When dc value equal 5V.



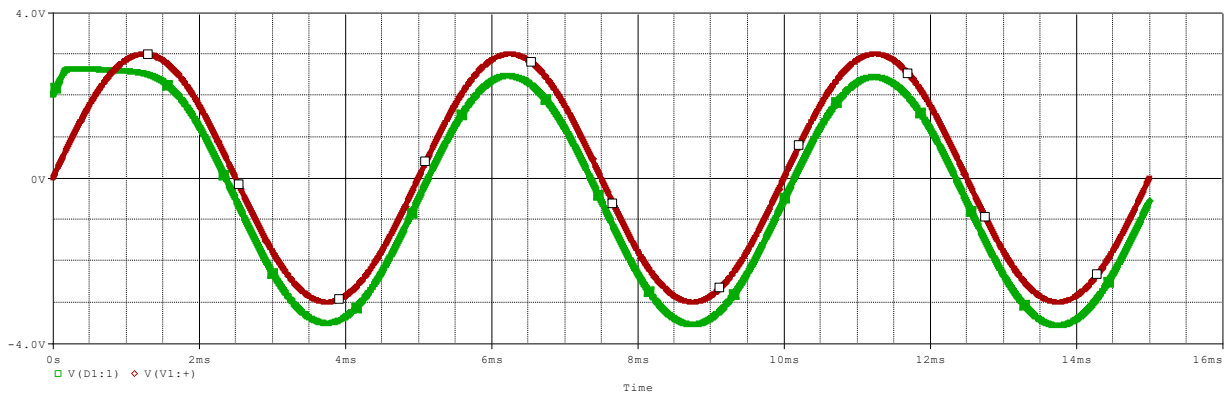
B. Clamping:



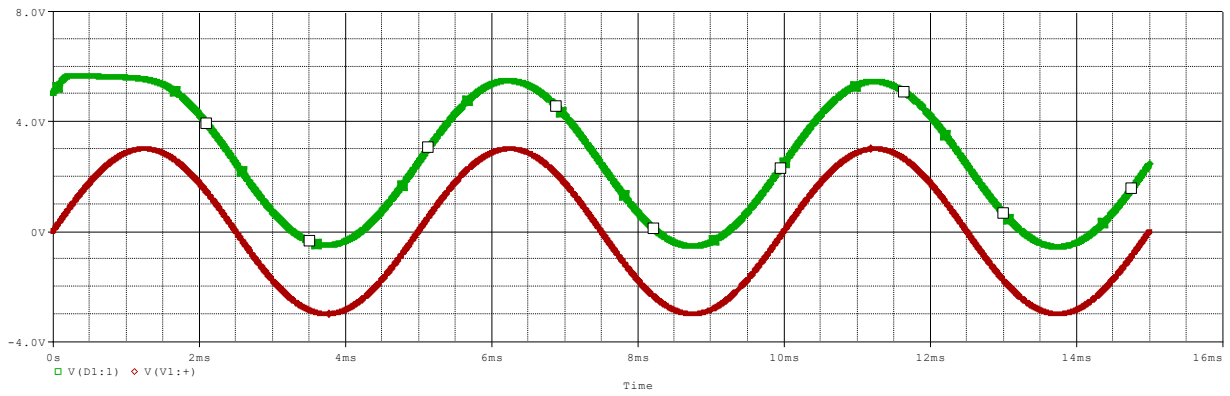
➤ When dc value equal 0V.



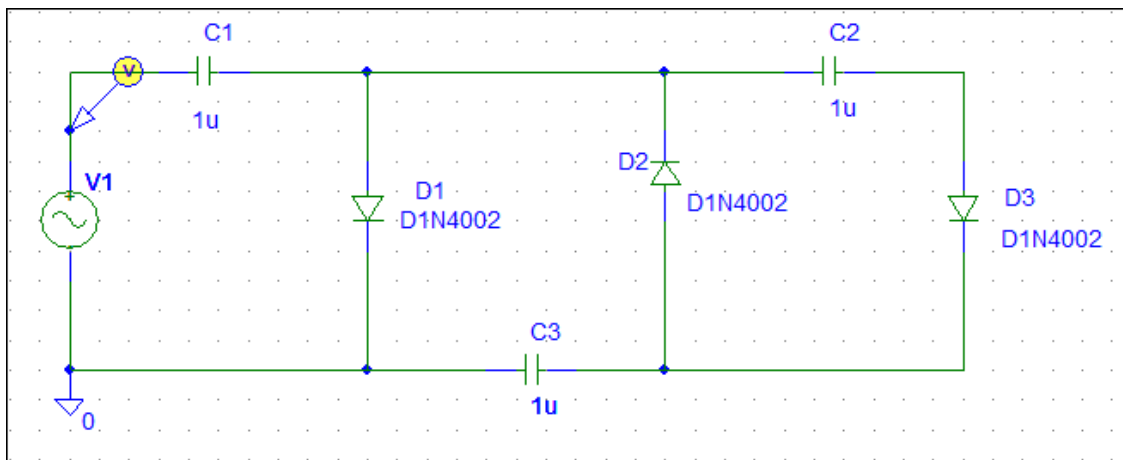
➤ When dc value equal 2V.



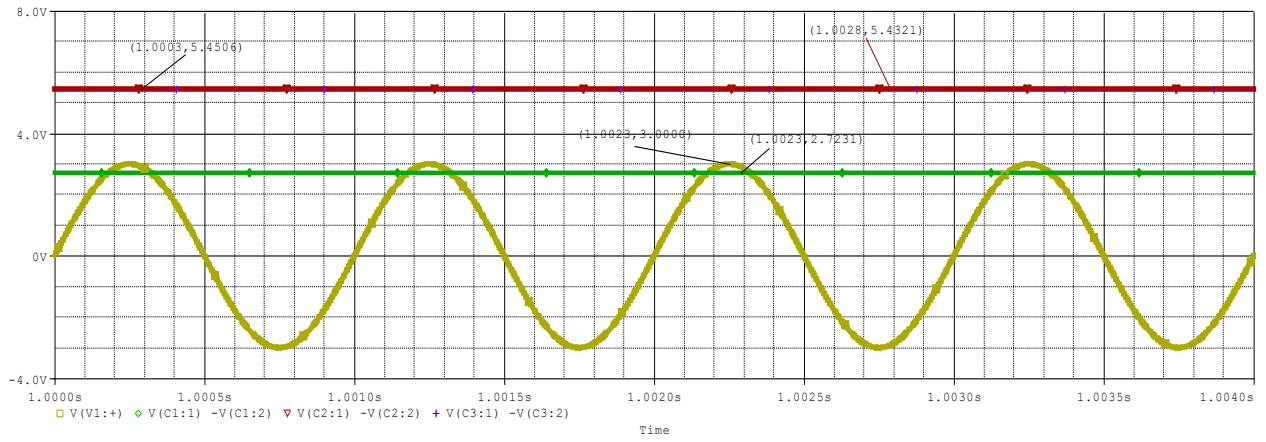
➤ When dc value equal 5V.



C. VOLTAGE MULTIPLIER CIRCUITS:



➤ Voltage across each capacitor.



➤ Voltage across C2+C3.

