Experiment # 6 Prelab ENEE2103

Diode Characteristic and Applications.

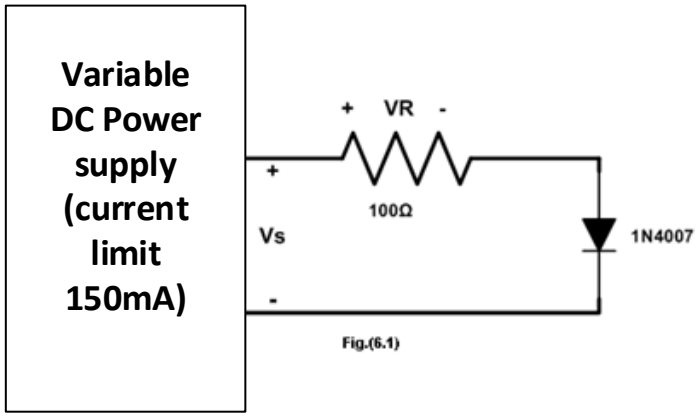
Pre-lab Work:

You have to use PSPICE to simulate to all practical circuits shown in the procedure below, and you have to do all necessary calculation you will need.

Procedure:

I. DIODE CHARACTERISTICS. ***(use dc sweep for Vs)***

1. Connect the Circuit of Fig. (6.1) vary the source from 0 to 3 V and measure V_D and I_D



2. Fill in the results in the table 6.1

V_S	VR	V_D	I_D
0			
0.2			
0.4			
0.6			
0.8			
1			
1.5			
2			
2.5			
3			

Table 6.1

3. Reverse the diode and repeat the simulations, what do you notice?

II. RECTIFICATION .

A. HALF - WAVE RECTIFICATION.

1. Connect the circuit as shown in Fig.(6-3), use diode D1N4148

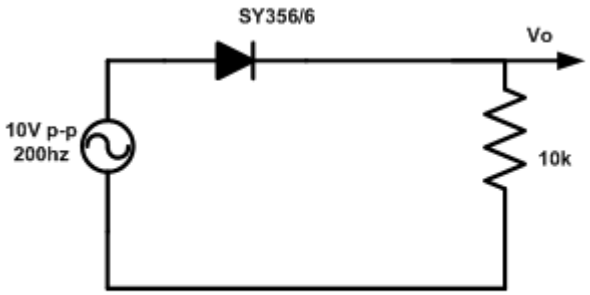


Fig.(6-3)

2. Simulate the circuit for 5 cycles, display only the last cycle using no print delay in the transient analysis setup.
3. Measure the period **T** and the peak voltage $\mathbf{V_{pk}}$ for the Vo
4. Estimate the dc value of the output voltage
5. Reverse the Diode and observe the output voltage
6. Now add a capacitor of 2.2µF to your circuit, the circuit becomes as shown in Fig.(6-4).

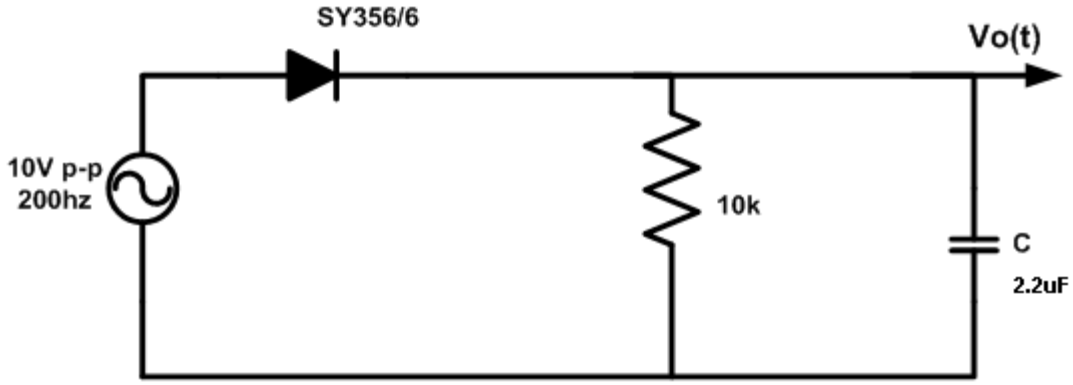


Fig.(6-4)

7. Simulate the circuit for 5 cycles, display only the last cycle..
8. Measure peak to peak ripple and estimate dc value

- Repeat the simulation with C=47 µF

B. FULL-WAVE RECTIFICATION

Diode bridge circuit as a full wave rectifier:

1. Simulate the circuit of Fig.(6-5) in Pspice, but do not use the transformer, instead use a source with 10 V p-p directly on bridge input.

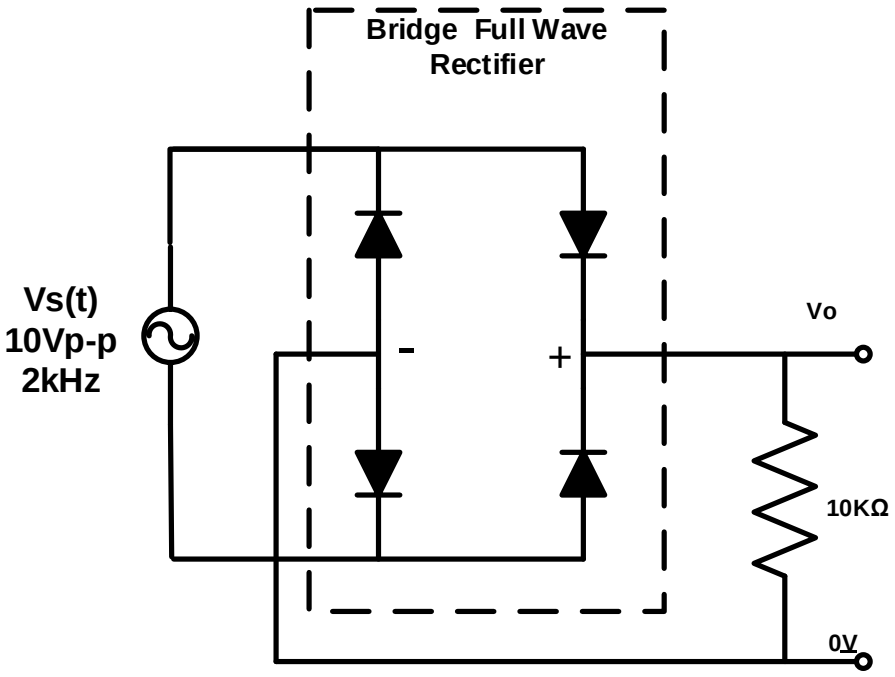


Fig.(6-5)

2. Simulate the circuit for 5 cycles, display only the last cycle.
3. Measure peak value and period then estimate dc value
4. Repeat the simulation with C=2.2 µF and measure ripple and estimate dc value

III. other applications:

A. clipping:

1. Connect the circuit as shown in Fig.(6-6)

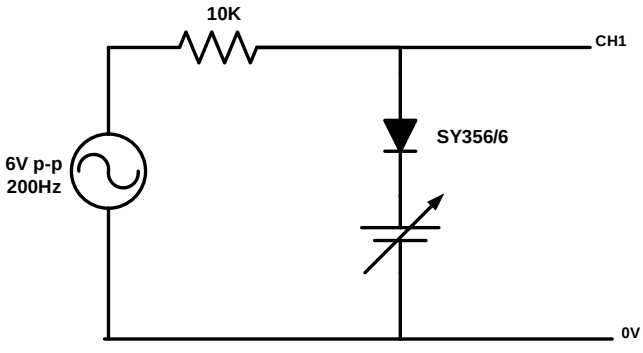


Fig.(6-6)

2. Simulate the circuit with three values of the dc source using parametric + transient analysis: 0V, 2V and 5 V

B. Clamping:

1. Connect the circuit shown in Fig.(6-7).

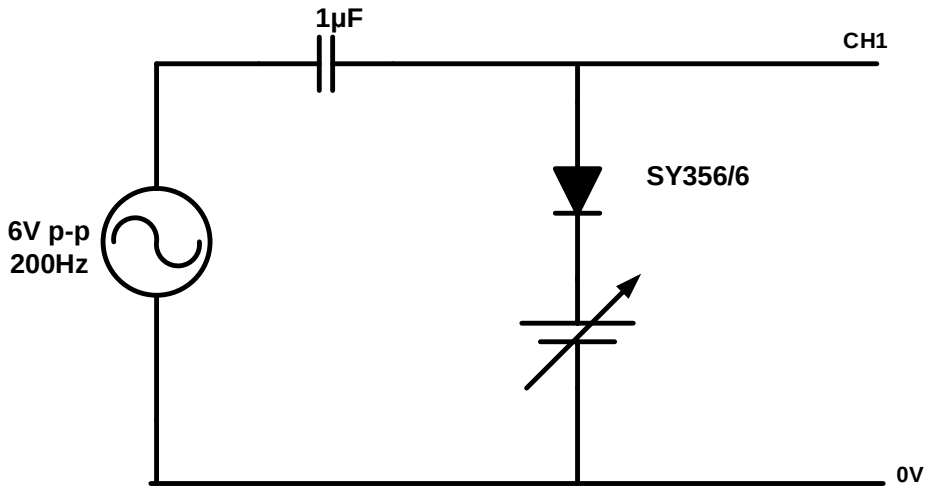


Fig.(6-7)

2. Follow the same steps you had followed in the previous part A (clipping).

C. VOLTAGE MULTIPLIER CIRCUITS

1. Set up the circuit as shown in Fig.(6-8). Use D1N914 for D1,D2 and D3

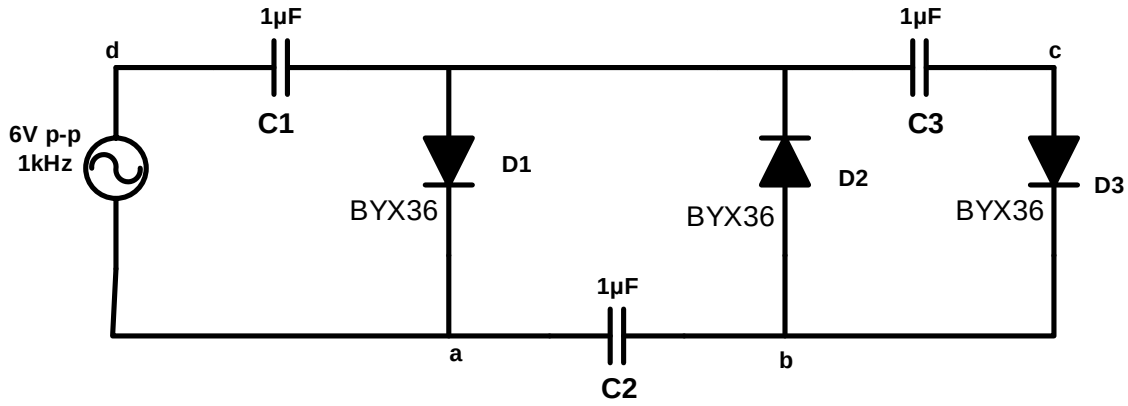


Fig.(6-8)

2. Measure the voltage across each capacitor.
3. Measure voltage across C1+C3