Department Of electrical and computer Engineering

ENEE2103 CIRCUITS AND ELECTRONICS LABORATORY

Experiment No.6 Prelab

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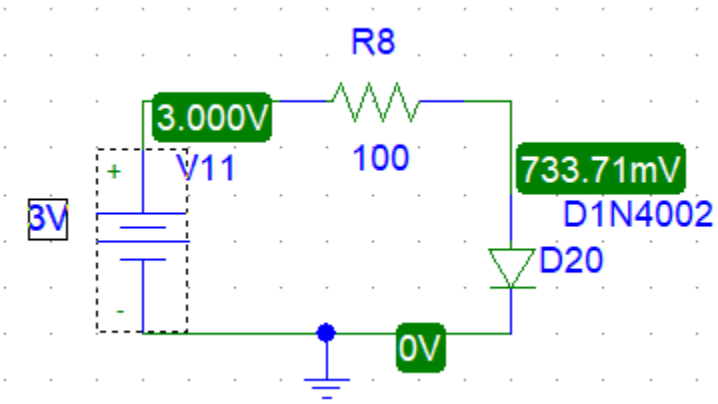
Date: 26/09/2021

I. DIODE CHARACTERISTICS

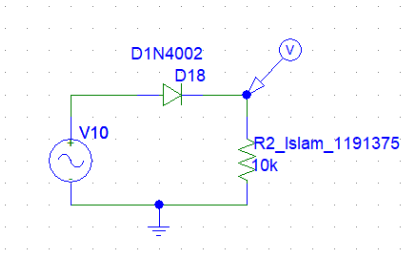


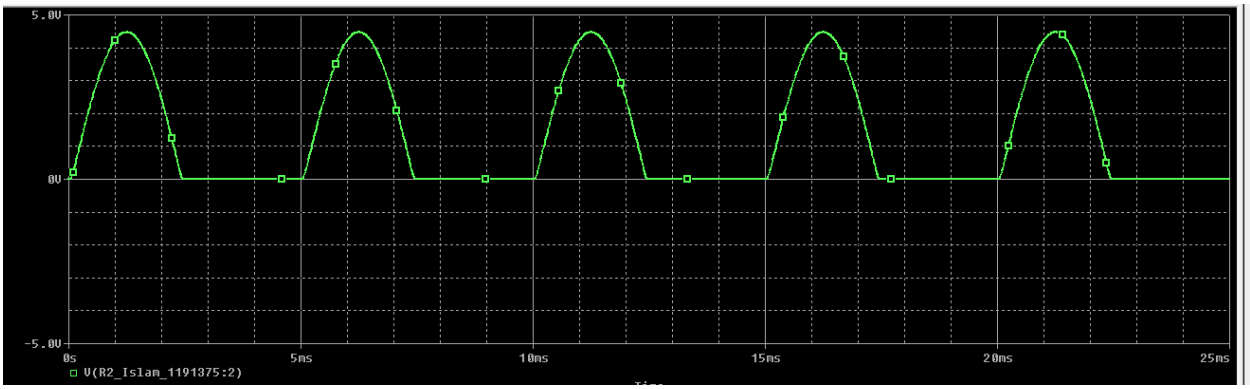
V_S	VR	V_D	I_D
0	almost zero	almost zero	0A
0.2	0.007mV	199.93mV	684.15nA
0.4	3.23mV	396.77mV	32.71uA
0.6	56.46mV	543.54mV	564.59uA
0.8	193.28mV	606.72mV	1.933mA
1	361.16mV	638.84mV	3.612mA
1.5	819mV	681mV	8.19mA
2	1295.32mV	704.68mV	17.79mA
2.5	1778.88mV	721.12mV	17.79mA
3	2266.29mV	733.71mV	22.66mA

After reversing the diode, on paper: the diode will act as open circuit sense it is reversed because the voltage on the anode is more than the voltage on the cathode. Practically on PSpice a small amount of current (almost zero) will go through the current which is called reverse saturation current.

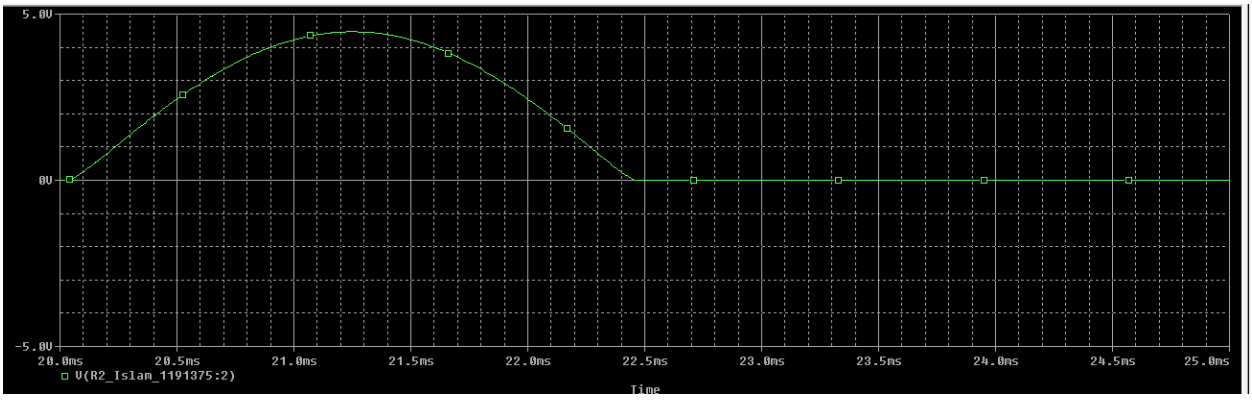
II. RECTIFICATION

a. HALF - WAVE RECTIFICATION.





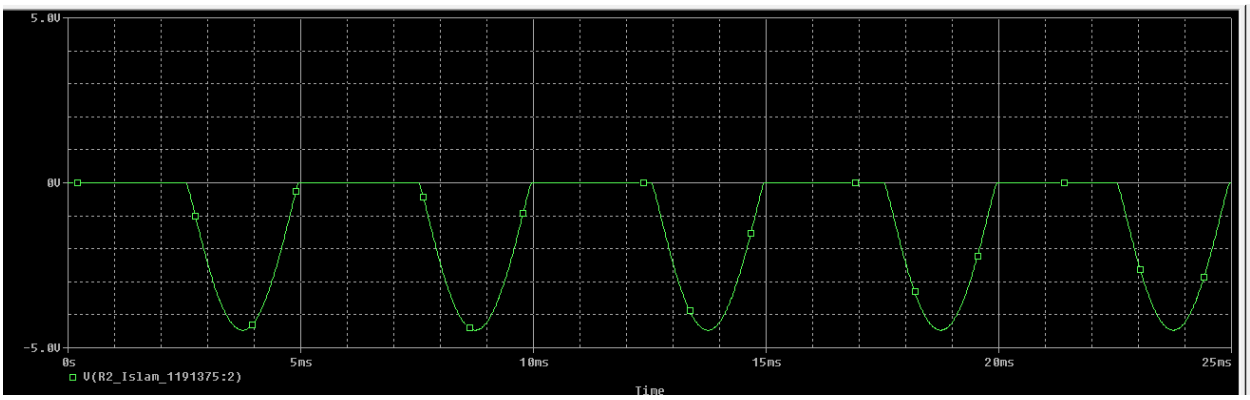
Last cycle:



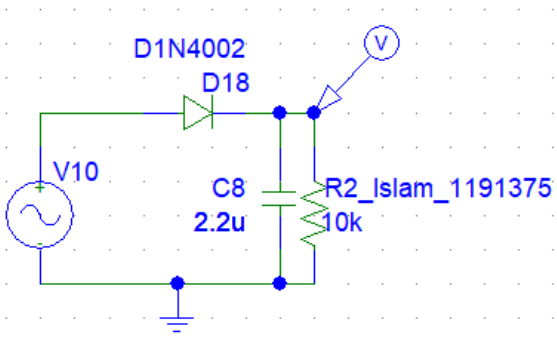
Using cursor VP=4.4685V and T=5ms equal to the source.

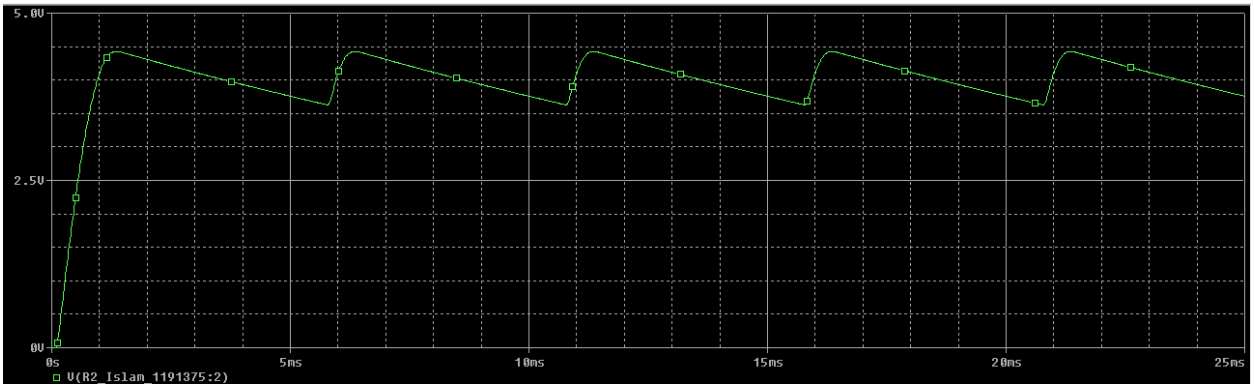
VDC=0.318Vm=0.318x4.4685=1.42V

After reversing the diode, the rectifier will pass the negative waves as shown below

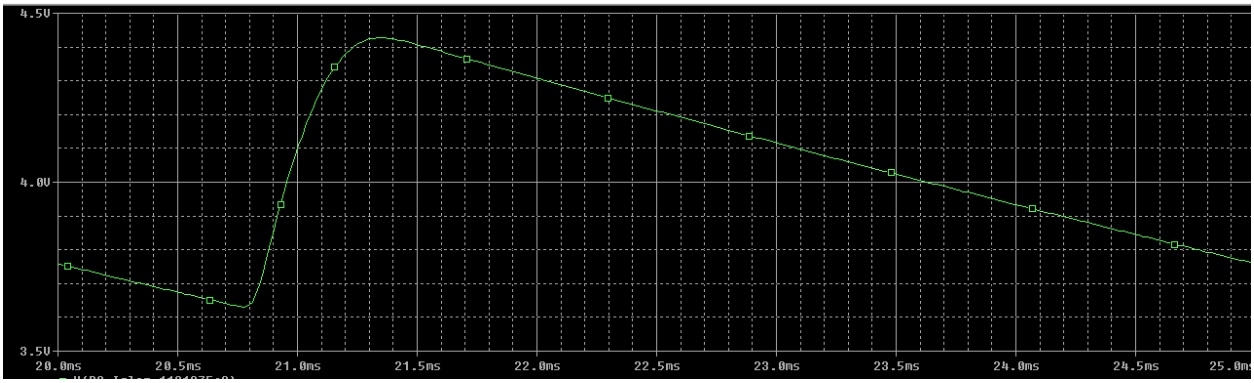


After putting the capacitor





Last cycle:

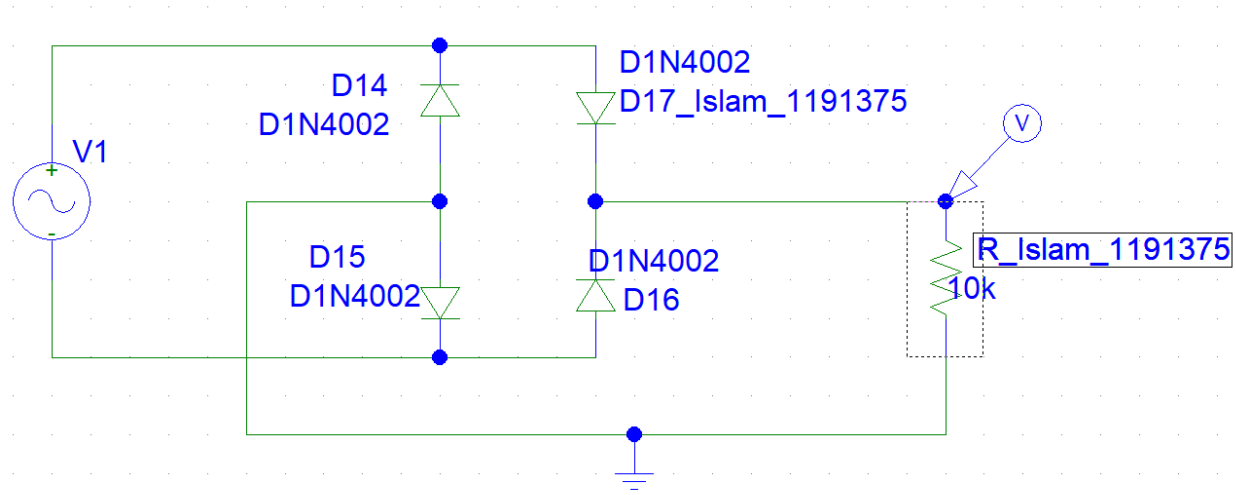


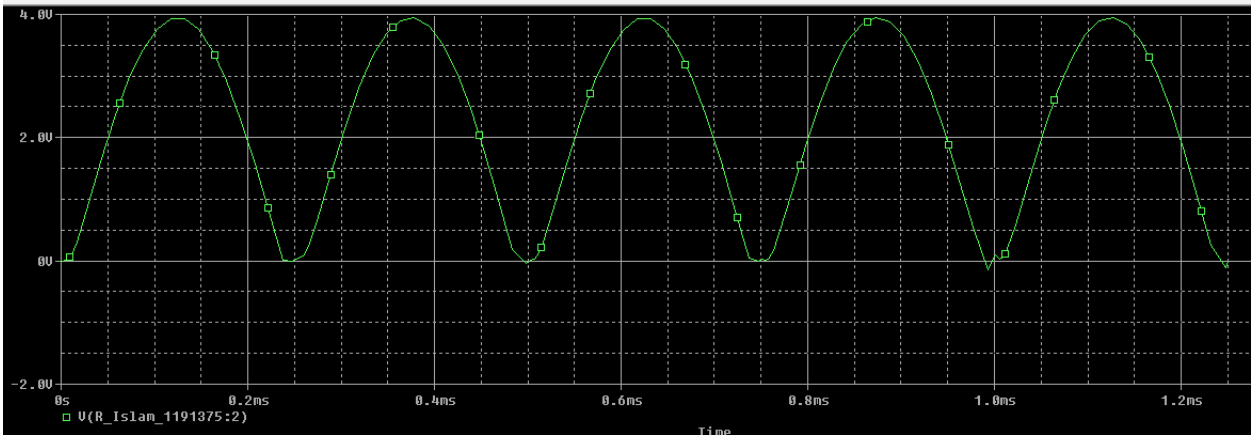
V_{lrp}-p=4.4273-3.6310 =0.7963 (From Slides) (Max and Min Value)

VDC=4.4272-0.5x0.7963 =4.028V

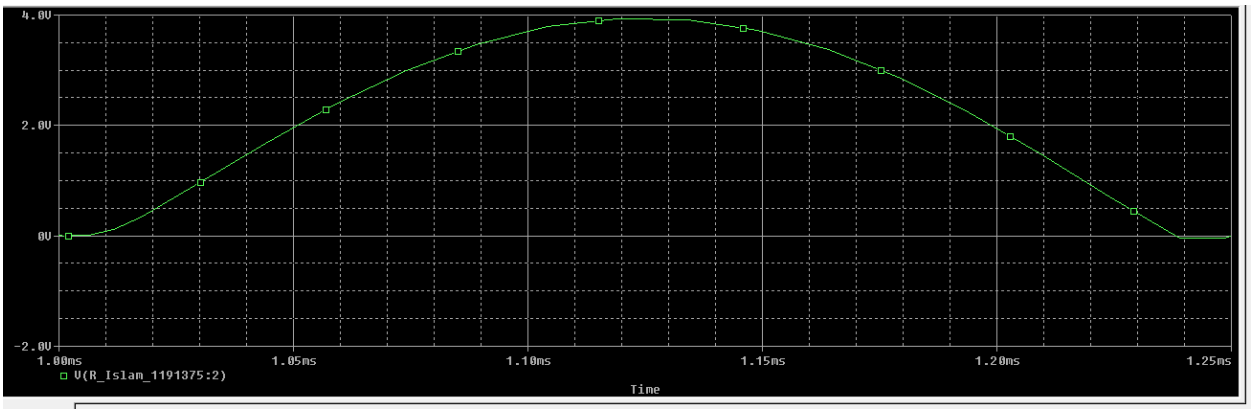
The Value of the capacitor was set to 47uF.

b. FULL-WAVE RECTIFICATION:





Last cycle:

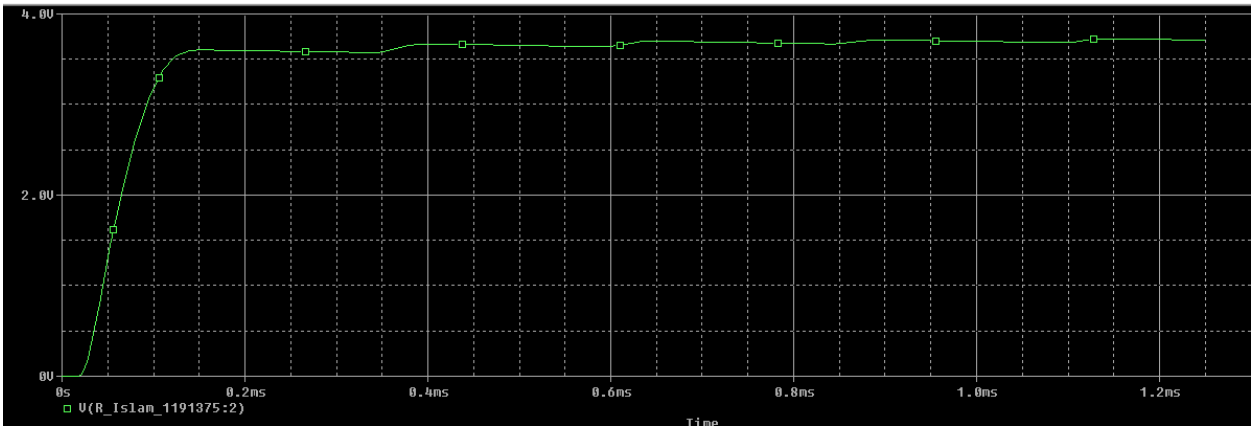


T=t0/2 =1/2000x2=0.25ms

Vp=3.978V

VDC=0.636Vp=2.52V

The 2.2uF capacitor connected:



V_{lrPP}= 3.653 -3.443=0.0210V

VDC=8.6038-0.5x0.0210=8.3218V

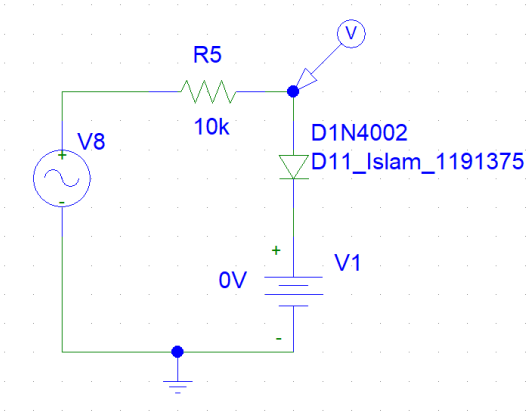
$V_{lrms}=v_{lrpp}$/2sqrt3=0.0210/2x1.732=8.87x10^{-3}

r%=vlrms/Vdc=0.23%

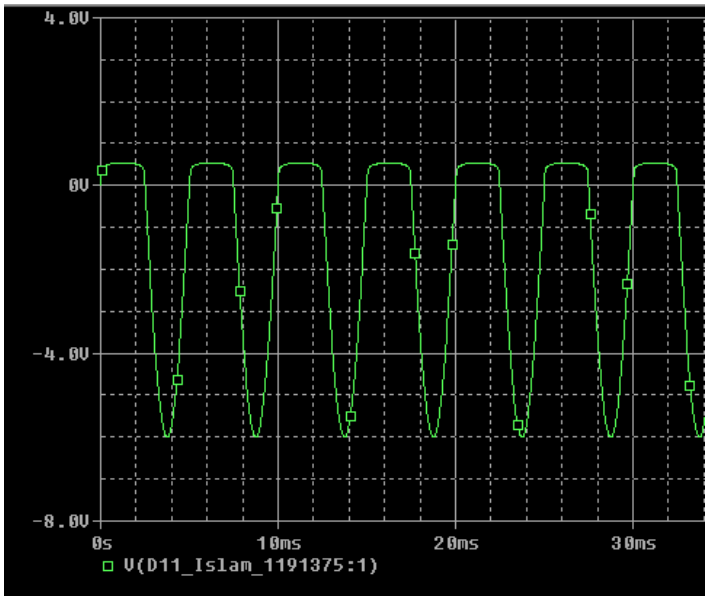
the ripple is small, so the simulation of the graph was close to DC

III. other applications:

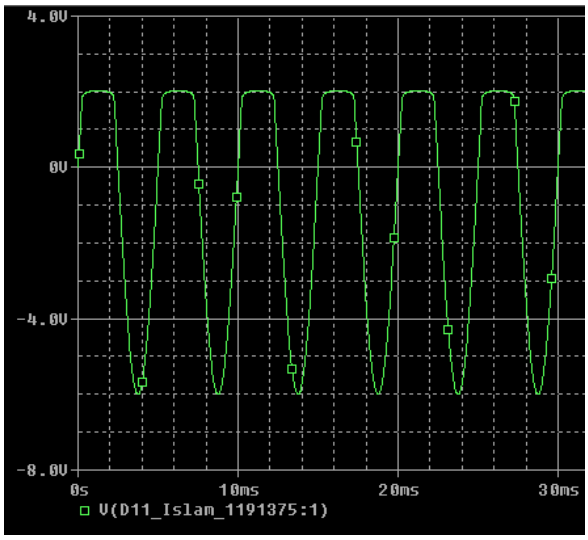
a. clipping: VDC=0



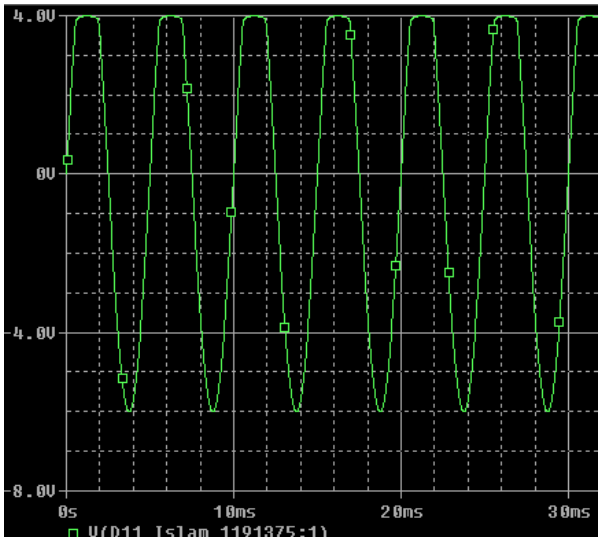
V_{DC}= 0V



V_{DC}= 1.5V

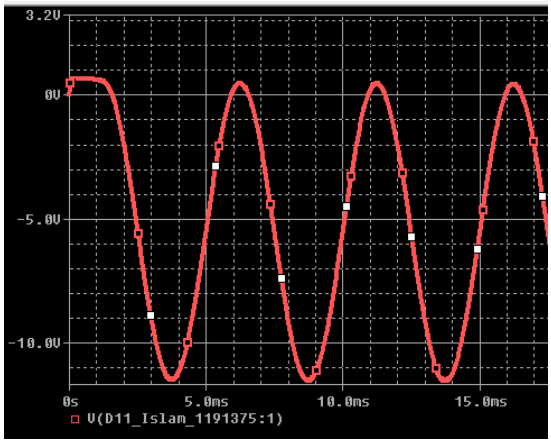


V_{DC}= 3.5V

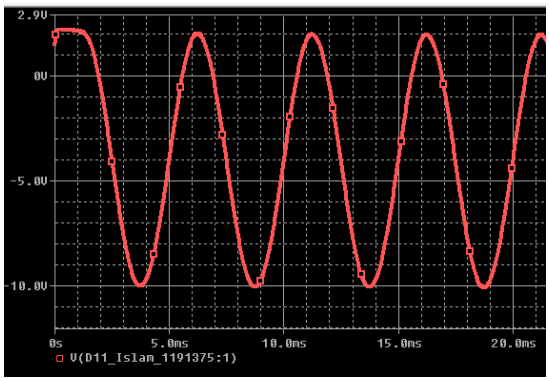


b. Clamping:

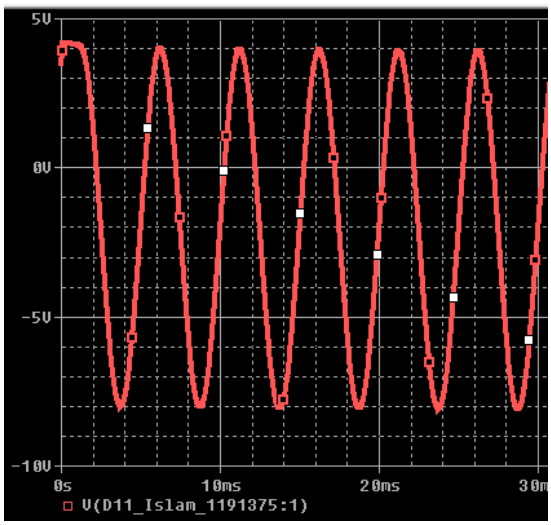
V_{DC}= 0V



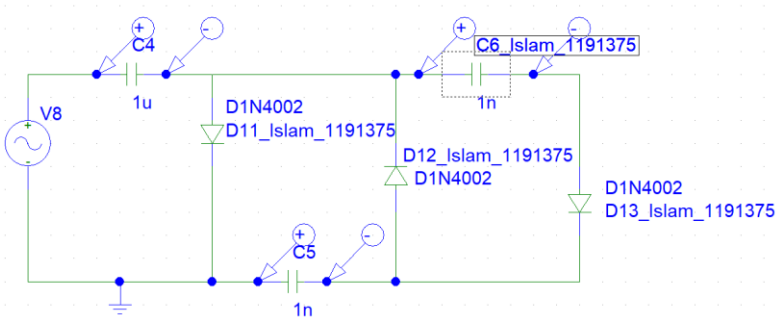
V_{DC}= 1.5V



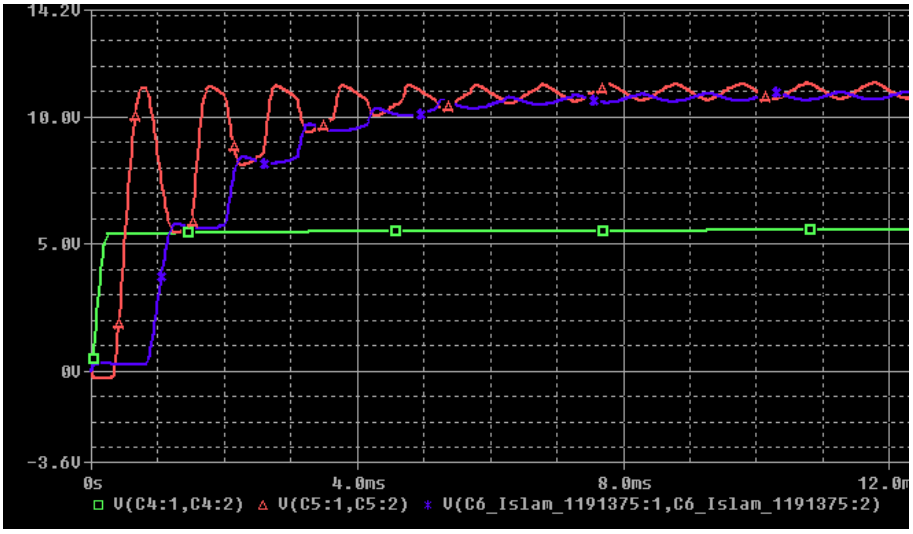
V_{DC}= 3.5V



c. VOLTAGE MULTIPLIER CIRCUITS



green is the voltage across C4, blue is the voltage across C5, red is the voltage across C6



C1+C3