

Department Of electrical and computer Engineering

ENEE2103 CIRCUITS AND ELECTRONICS LABORATORY

Experiment No.6 Prelab

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I. DIODE CHARACTERISTICS



|  |  |  |  |
| --- | --- | --- | --- |
| VS | VR | VD | ID |
| 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**

1. 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:



Vlrp-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.

1. 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:



VlrPP= 3.653 -3.443=0.0210V

VDC=8.6038-0.5x0.0210=8.3218V

Vlrms=vlrpp/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:**

1. clipping: VDC=0



VDC= 0V



VDC= 1.5V



VDC= 3.5V



1. Clamping:

VDC= 0V



VDC= 1.5V



VDC= 3.5V



1. VOLTAGE MULTIPLIER CIRCUITS



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



C1+C3

