Lab 8 – Results: Diodes

*ECE203: Electrical Circuits II*

|  |  |  |
| --- | --- | --- |
| Name | Student ID | CCID |
|  |  |  |
|  |  |  |

# Diode Characteristics

Triangle – 2VPEAK@100Hz

|  |  |  |  |
| --- | --- | --- | --- |
| **Forward Biased** | | **Reverse Biased** | |
| **ID** *(uA)* | **VD***(V)* | **VD** *(V)* | **ID** *(uA)* |
| ~ 250 |  | ~ 0 |  |
| ~ 500 |  | ~ -0.5 |  |
| ~ 750 |  | ~ -1 |  |
| ~ 1000 |  | ~ -1.5 |  |
| ~ 1250 |  | ~ -2 |  |

# Half-wave Diode Rectifier

Sine – 5VPEAK@100Hz

|  |  |  |
| --- | --- | --- |
| **VINPEAK** *(V)* | **VOUTPEAK** *(V)* | **VdPEAK** *(V)* |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Average** | **AC RMS** | **DC RMS** |
| **VIN** *(V)* |  |  |  |
| **VOUT** *(V)* |  |  |  |

## Conduction Angle (Half-wave)

Record the necessary unknown measurement quantities in the spaces provided below that are required in order to calculate the conduction angle for the half-wave diode rectifier. Include measurement titles, the units used and your measured quantity. Also record your calculated conduction angle.

|  |  |  |
| --- | --- | --- |
|  |  | **Conduction angle** *(°)* |
|  |  |  |

1. On the provided sketchbook clearly draw the two cycles of the relevant half-wave conduction angle waveforms using cursors to indicate the relevant quantities you measured. Make sure to add axes titles, labels, units, and the relevant measured values. Also, show your calculation of the half-wave diode rectifiers conduction angle.

# Full-wave Diode Rectifier

Sine – 5VPEAK@100Hz

|  |  |  |
| --- | --- | --- |
| **VINPEAK** *(V)* | **VOUTPEAK** *(V)* | **(VINPEAK – VOUTPEAK)** *(V)* |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Average** | **AC RMS** | **DC RMS** |
| **VIN** *(V)* |  |  |  |
| **VOUT** *(V)* |  |  |  |

## Conduction Angle (Full-wave)

Record the necessary unknown measurement quantities in the spaces provided below that are required in order to calculate the conduction angle for the full-wave diode rectifier. Include measurement titles, the units used and your measured quantity. Also record your calculated conduction angle.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | **Conduction angle** *(°)* |
|  |  |  |  |

On the provided sketchbook clearly draw the two cycles of the relevant full-wave conduction angle waveforms using cursors to indicate the relevant quantities you measured. Make sure to add axes titles, labels, units, and the relevant measured values. Also, show your calculation of the full-wave diode rectifiers conduction angle.

# Positive Biased Diode Clipper

Triangle – 2VPEAK@100Hz with 2V offset

|  |  |
| --- | --- |
| **VIN** *(V)* | **VOUT** *(V)* |
| ~ 0.5 |  |
| ~ 1 |  |
| ~ 1.5 |  |
| ~ 2 |  |
| ~ 2.5 |  |
| ~ 3 |  |
| ~ 3.5 |  |
| ~ 4 |  |

The following pages have been left for you to include the waveforms and plots that you are required to create as part of your post-lab.

Use the provided sketchbook to hand draw the required waveforms and to show the required calculations. Either scan or take a picture of the completed sketchbook to include in the appropriate place in this results sheet.

To create your plots you can use whichever software you would like (Excel, Matlab, etc), export your plot as an image and import it into your Lab 8 - Results sheet in the appropriate place.

Your plots should include:

* A Plot title
* Label your axes and show what unit of measure is used.
* Include a marking for your data-points.
* Include a line between your data-points in the same series.
* Include a legend.
* Make sure your scales are appropriate and visible.

# Diode Characteristic Curve

< Insert your plot here >

Delete all the light grey text and insert your plot.

Diode Characteristic Curve: Plot the forward biased and reverse biased diode current vs. diode voltage.

1. < Insert a scanned image of your sketchbook for the Half-wave Diode Rectifier here >
2. Delete all the light grey text and insert your image.
3. < Insert a scanned image of your sketchbook for the Full-wave Diode Rectifier here >
4. Delete all the light grey text and insert your image.

# Biased Positive Shunt Clipper

< Insert your plot here >

Delete all the light grey text and insert your plot.

Biased Positive Shunt Clipper: Plot the output voltage (VOUT) vs. the input voltage (VIN).