# Lab 2

Measuring Diode Characteristics using Multisim

Learning outcomes

1) Learn two techniques to measure Diode's characteristics

Experiment 1) Measure Diode's characteristics using step by step measurements

A) Create new Multisim project
B) Insert and connect the required components
   1. Insert R1 resistor and adjust its value to 100 Ω
   2. Insert a DC power source
   3. Insert a Ground
   4. Insert 1N4007G Silicon Diode from Diode list
   5. Insert 3 multimeters from the rightmost list (the first icon is the Multimeter)
   6. Connect the circuit as shown bellow
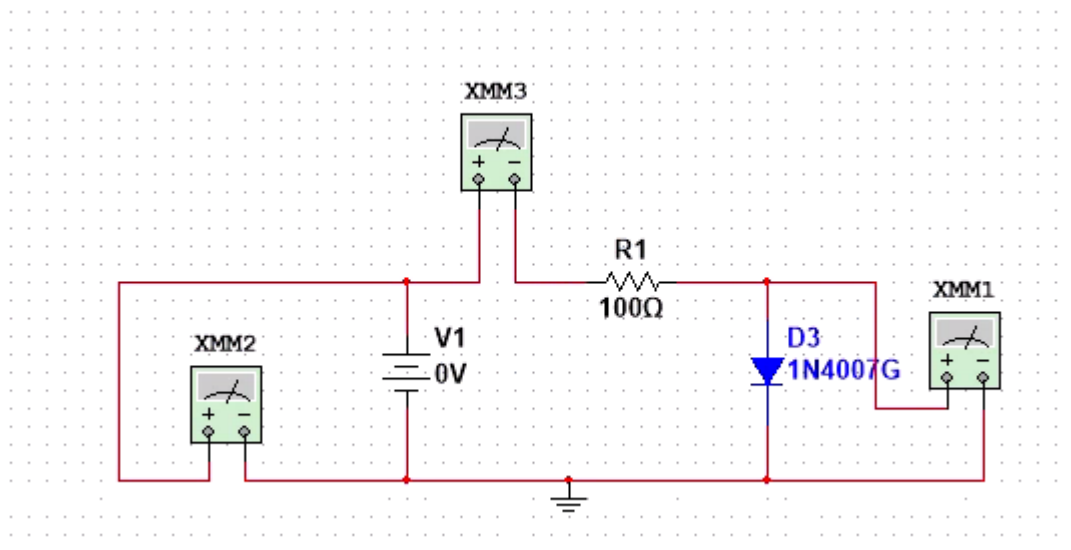
C) Simulate and change the value of DC source as follows:

-3V	to	0V	step	1
0V	to	3.2V	step	0.2
3.2V	to	5V	step	0.4
5V	to	10V	step	0.5
10V	to	30V	step	5V

D) For each vale of V1 measure the current through Diode I_D and Diode voltage V_D
E) What do you notice? Is it a linear relation? Does the slope is constant?
F) Measure the slope (assuming linear) for the line passing through the last 4 entries of the table
G) Save the current project with a proper name, e.g. Ohm's law step by step

Experiment 2) Measure Diode's characteristics automatically using AC source and oscilloscope

A) Insert and connect the required components
   1. Insert 2 resistors and set their R2 1Ω and R1 100Ω
   2. Insert an AC power source and set its rms to 21V (≈60Vpp)
   3. Insert from the same list a ground
   4. Insert an oscilloscope from the rightmost list (the fourth icon is the oscilloscope) and another on the far left to measure input
   5. Insert the same Diode of Exp 1; 1N4007G
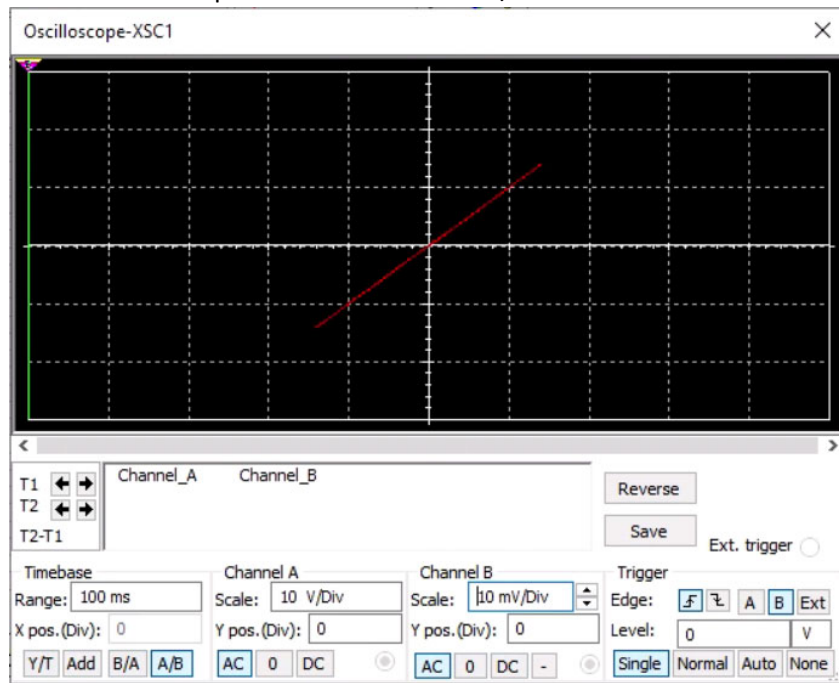   6. Connect the circuit as shown bellow
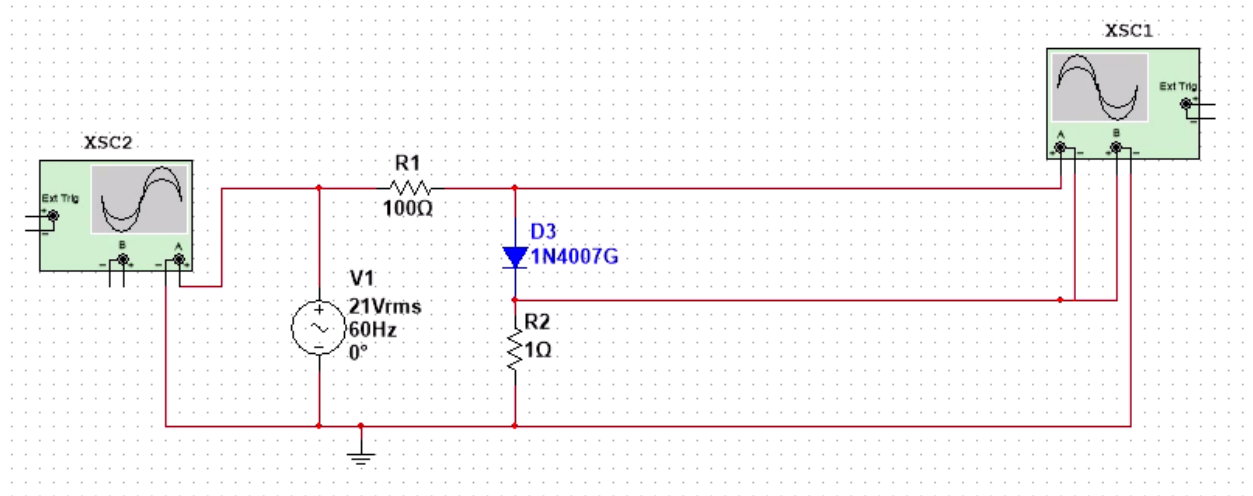
B) Running the simulation
   1. From Simulate click Run
   2. Double on the oscilloscope
   3. Set the front panel knobs of the oscilloscope as shown bellow
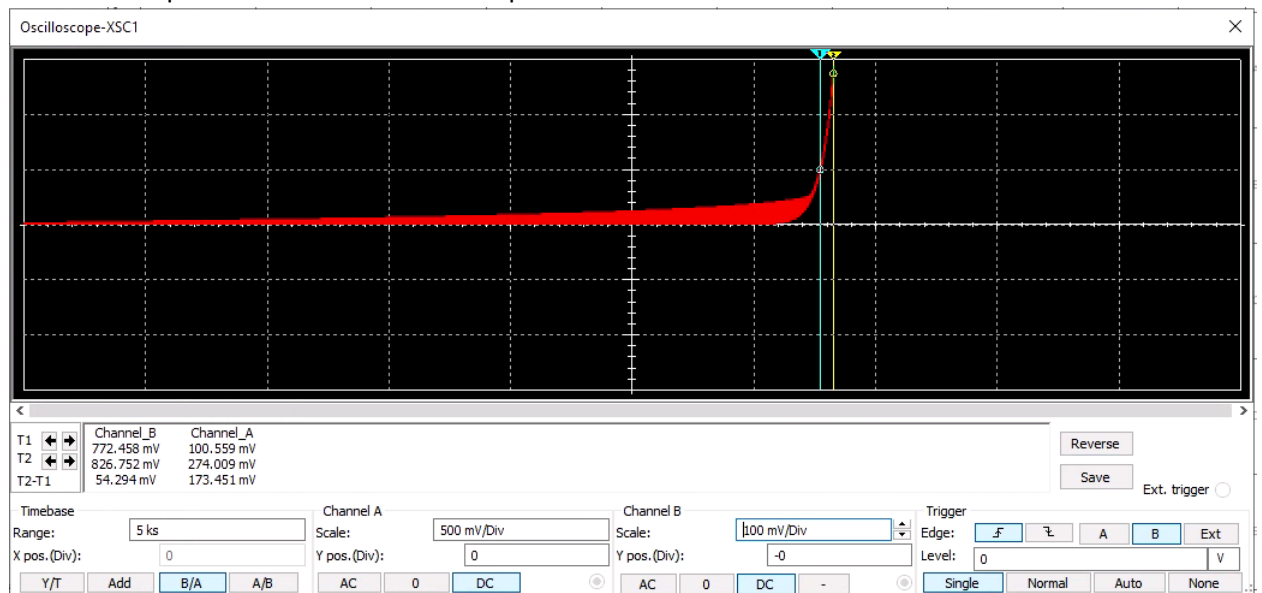
   4. Try to measure the Diode forward resistance using the part of the curve between the 2 vertical lines in the figure above

5. Set the oscilloscope as shown bellow in A/B mode


6. Measure the slope of the line
7. What do you notice?
8. Repeat the procedure after changing the R1 value to 0.1Ω

C) Save the current project with a proper name, e.g. Ohm's law automatic characteristic measurements

Experiment 3) Measure Diode's characteristics automatically using AC source and oscilloscope (using realistic oscilloscope connection)

In reality, practical lab oscilloscope has a common ground for both A and B channels so the precious connection in Exp 2 is not realistic and will cause a short circuit on R2

A) Insert and connect the required components as shown bellow
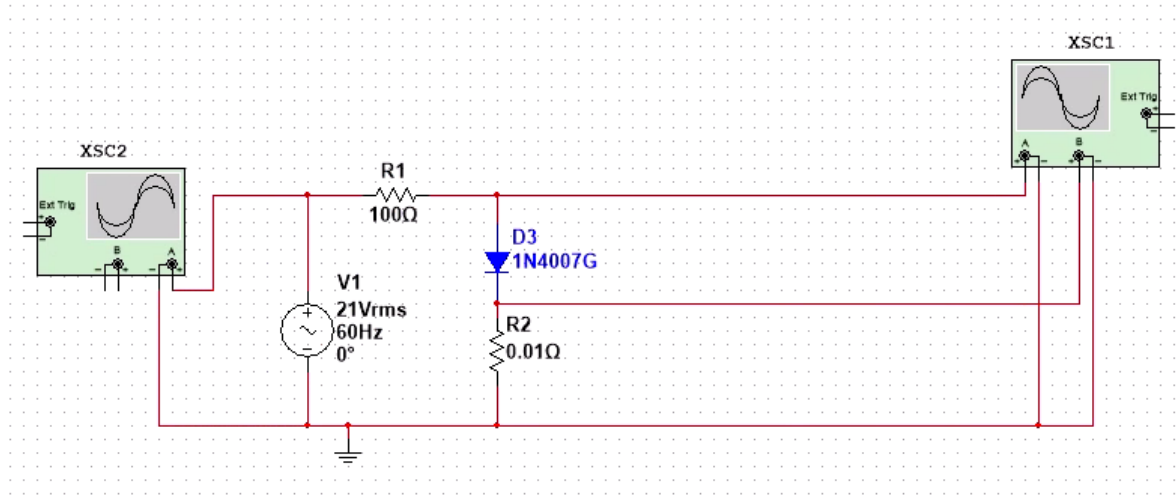
B) Repeat the same procedure of Exp 2, and get the characteristics on the oscilloscope screen of XSC1
C) Why R2 changed from 1 Ω in Exp 2 to 0.01 Ω in Exp 3? Can we keep it 1 Ω, should the measurement error increases in that case?