Electronics Lab
Lab Session 1: Diode Characteristics

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Part one:

1.Construct the circuit shown below, measure the forward voltage V_F, V_{R1}, and compute I_F.

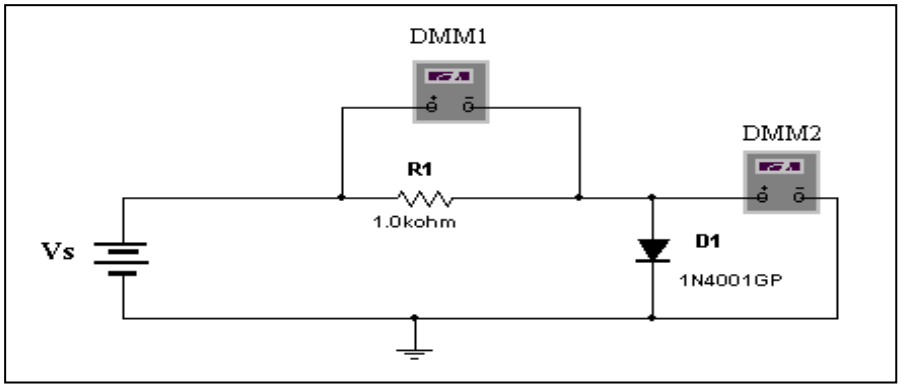
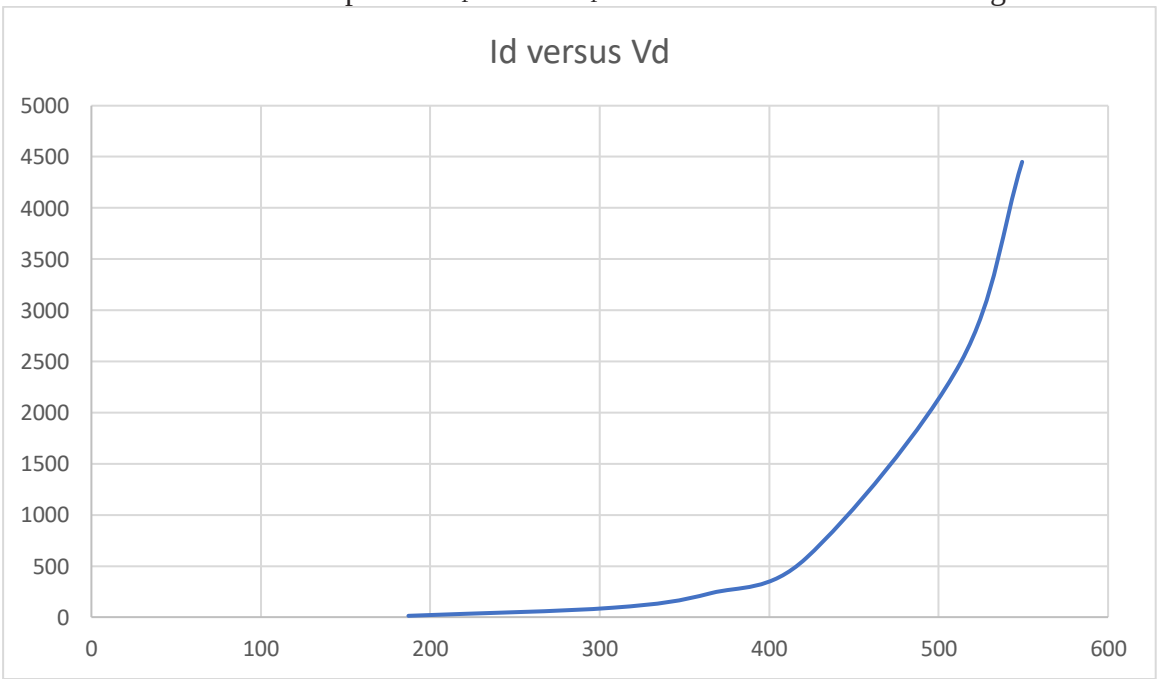


Table2: Diode Forward Currents and Voltages

V_S	V_{R1} Normal	V_D Normal	$I_D = V_R / R$ Normal
0.2	12.97 mV	187.1 mV	12.795 uA
0.4	92.271 mV	307.729 mV	92.271 uA
0.6	234.381 mV	365.619 mV	234.381 uA
1.0	578.147 mV	421.853 mV	578.147 uA
3.0	2.487 V	512.901 mV	2487 uA
5.0	4.451 V	549.281 mV	4451 uA

2.Use your results from Table 2 to plot the I_F versus V_F curve for both diodes in the figure below.



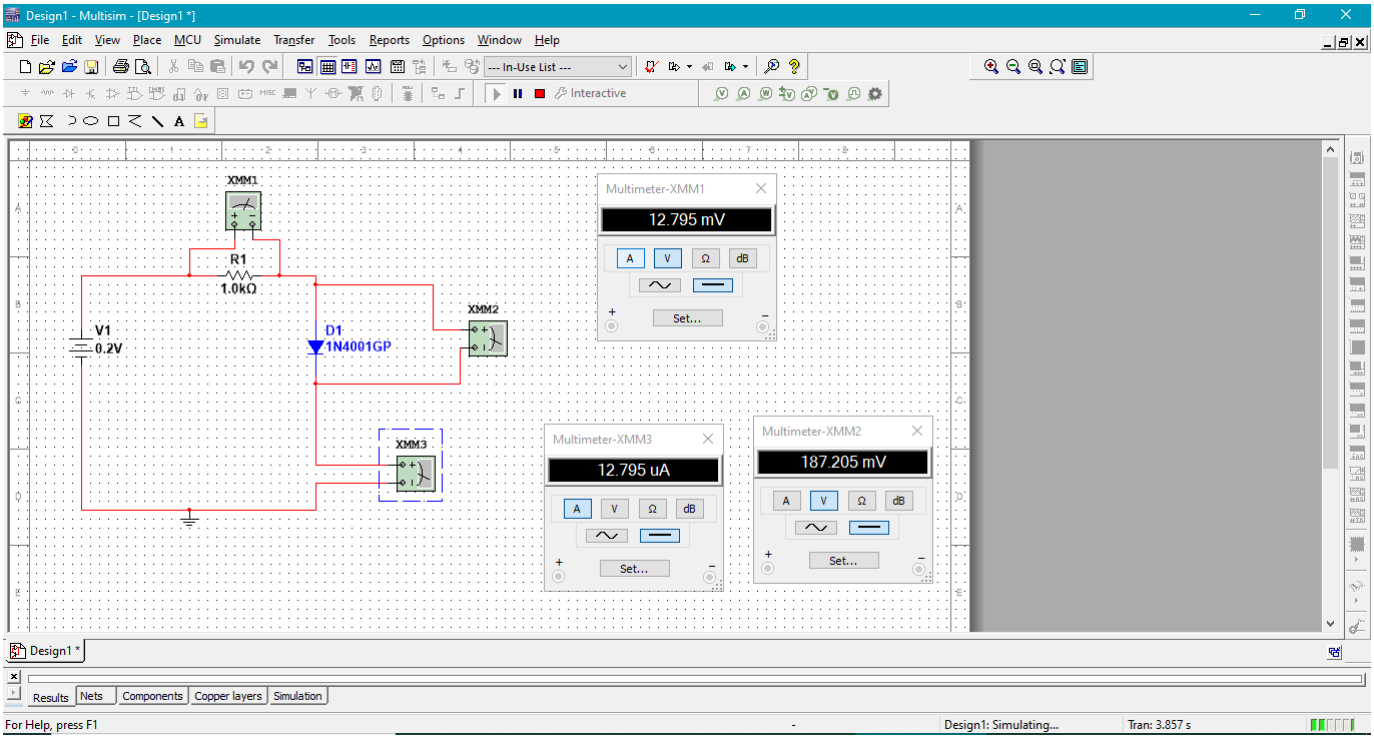
3.Graphically determine the dynamic resistance of the normal diode at 3.

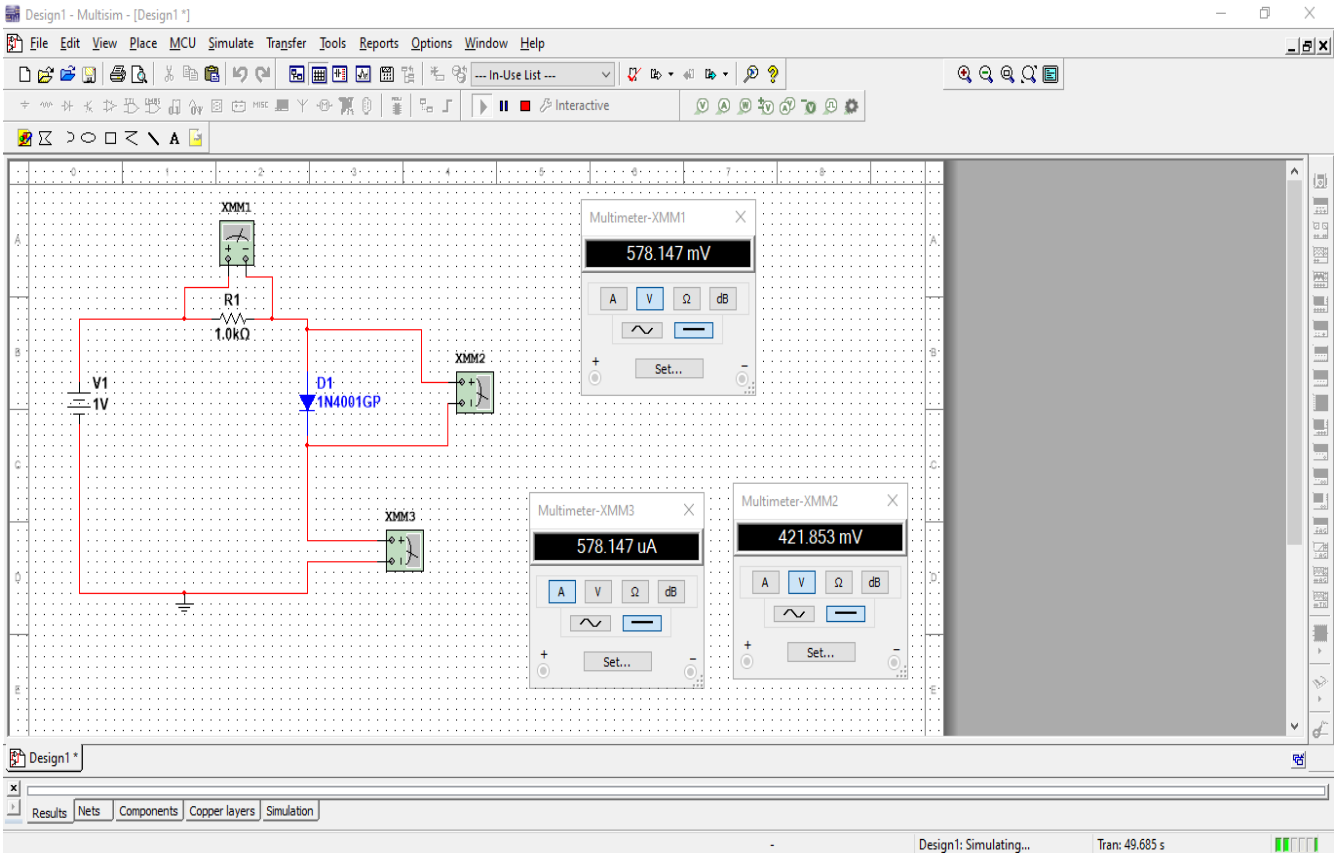
Rd = Δ V \ ΔI =(549.281 mV - 421.853 mV)\(4451 uA -578.147 uA) =33.21 ohm

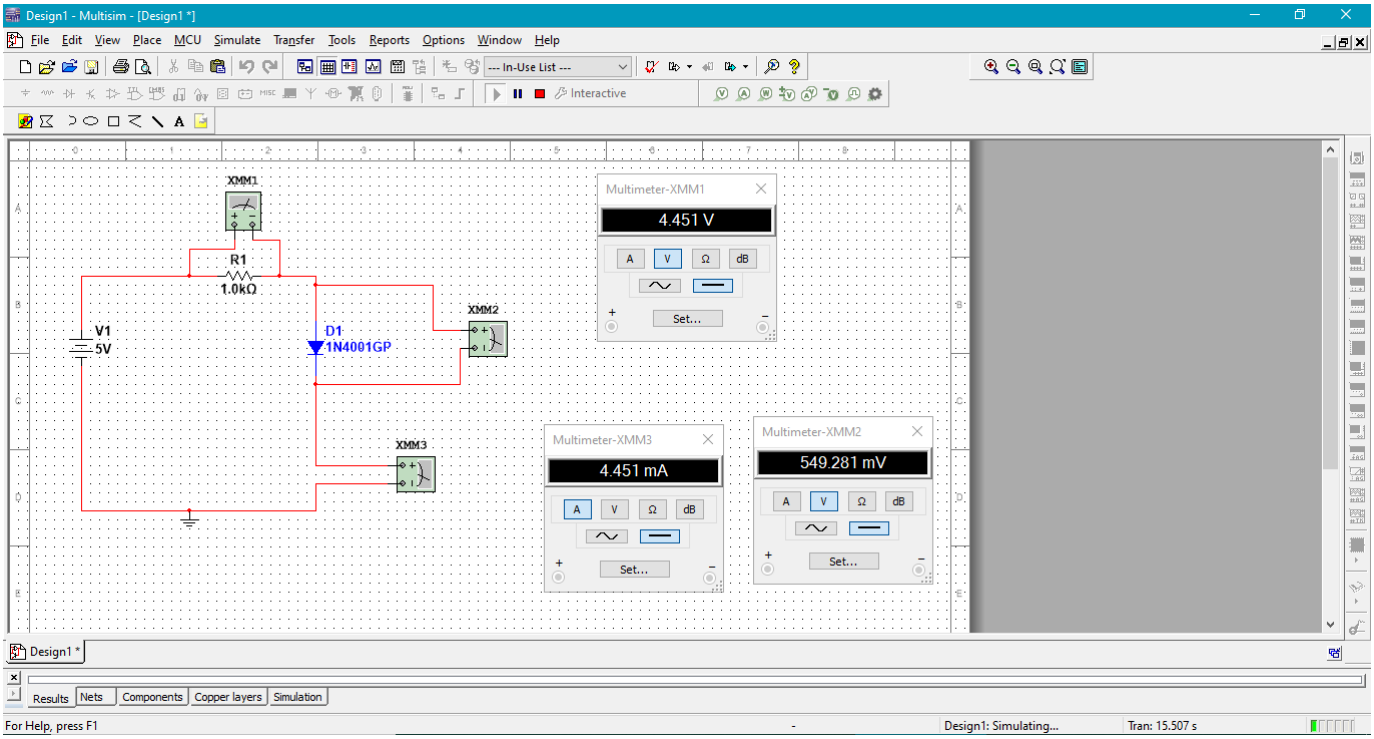
4. Determine the static resistance of the normal diode at 1.

R= VD\ID = 421.853mV \578.147uA =729.66 ohm

There are some of results in multisim:




Design1 - Multisim - [Design1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In-Use List ---
Interactive
XMM1
R1
1.0kΩ
V1
1V
D1
1N4001GP
XMM2
XMM3
Multimeter-XMM1
578.147 mV
Multimeter-XMM3
578.147 uA
Multimeter-XMM2
421.853 mV
A V Ω dB
Set...
Design1 *
Results Nets Components Copper layers Simulation
Design1: Simulating...
Tran: 49.685 s


Design1 - Multisim - [Design1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In-Use List ---
Interactive
XMM1
R1
1.0kΩ
V1
5V
D1
1N4001GP
XMM2
XMM3
Multimeter-XMM1
4.451 V
Multimeter-XMM3
4.451 mA
Multimeter-XMM2
549.281 mV
A V Ω dB
Set...
Design1 *
Results Nets Components Copper layers Simulation
For Help, press F1
Design1: Simulating...
Tran: 15.507 s

Part Two :

5.Construct the circuit shown below, Measure the voltage across the zener diode, and record this values.

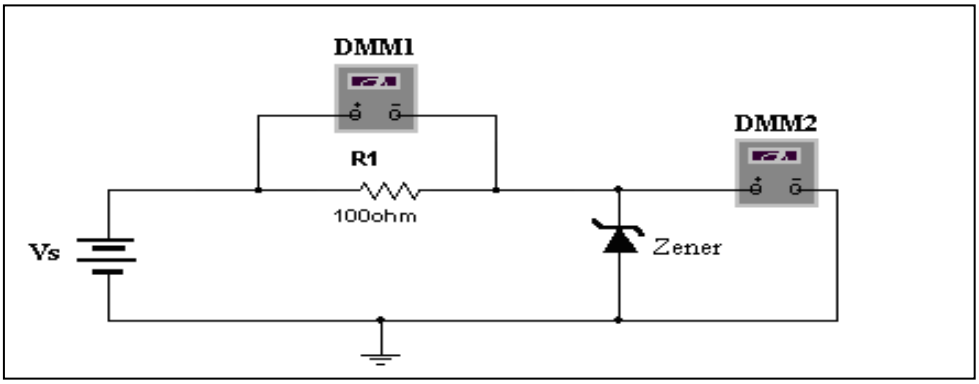
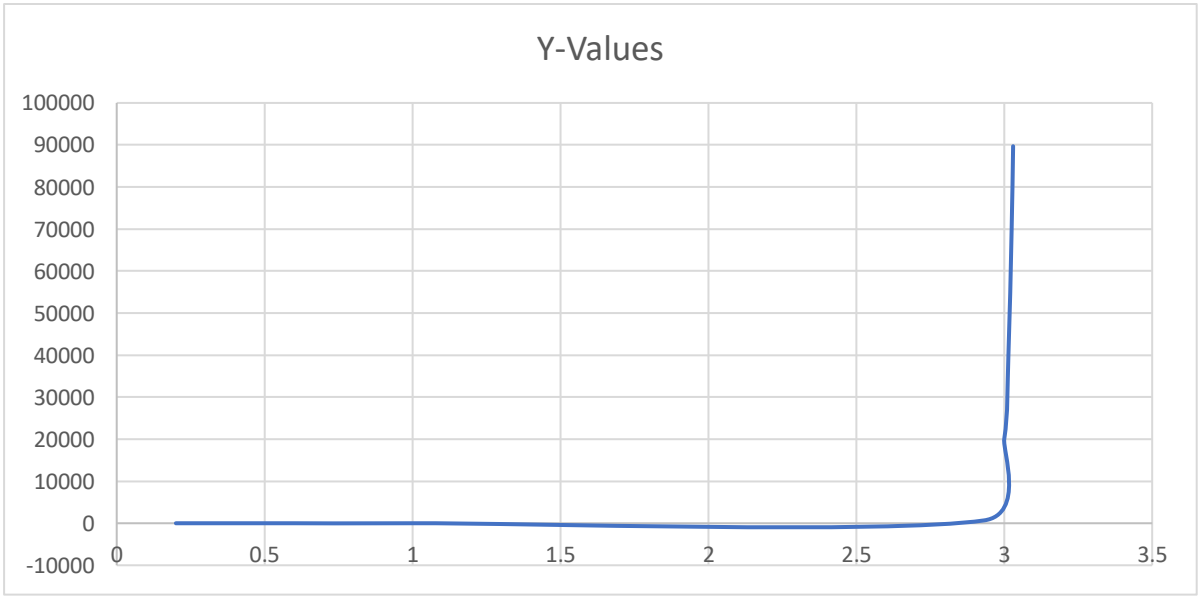


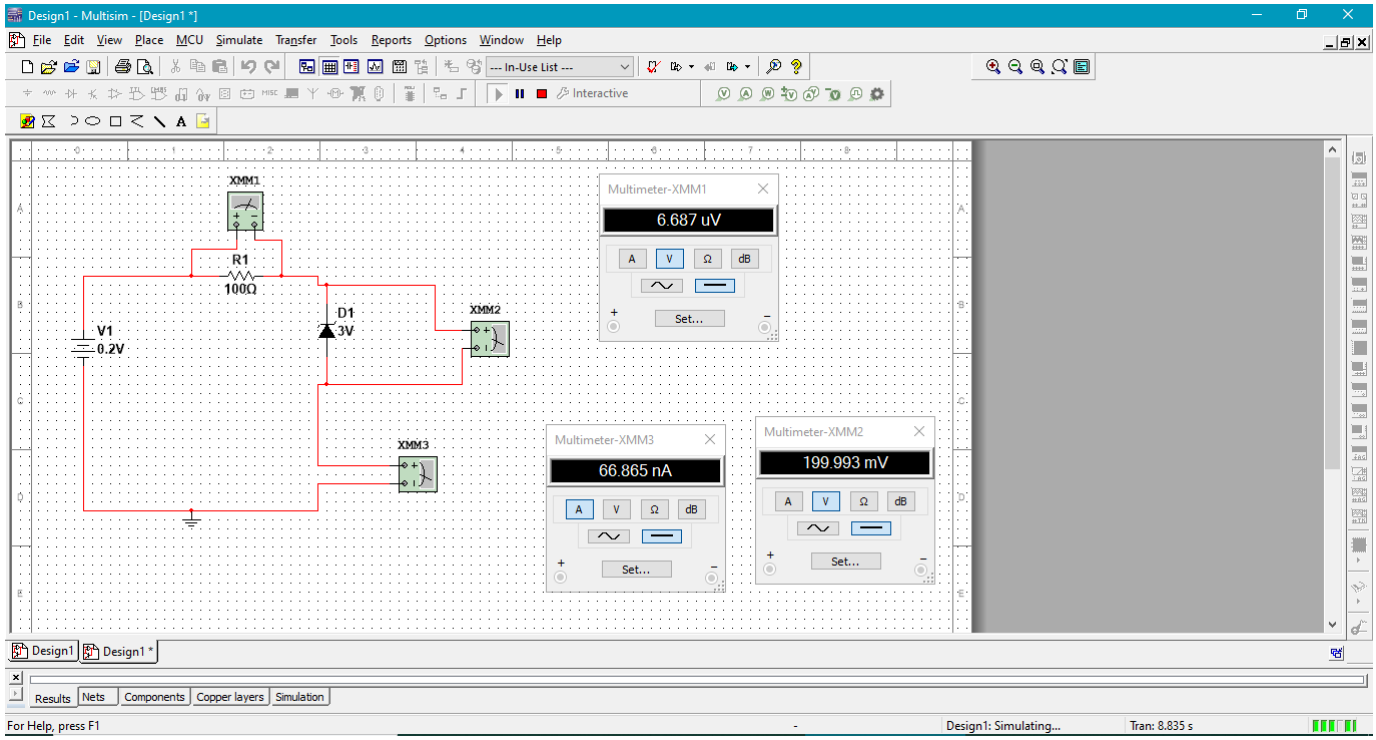
Table.3: Measurement of V_{R1} and Vz

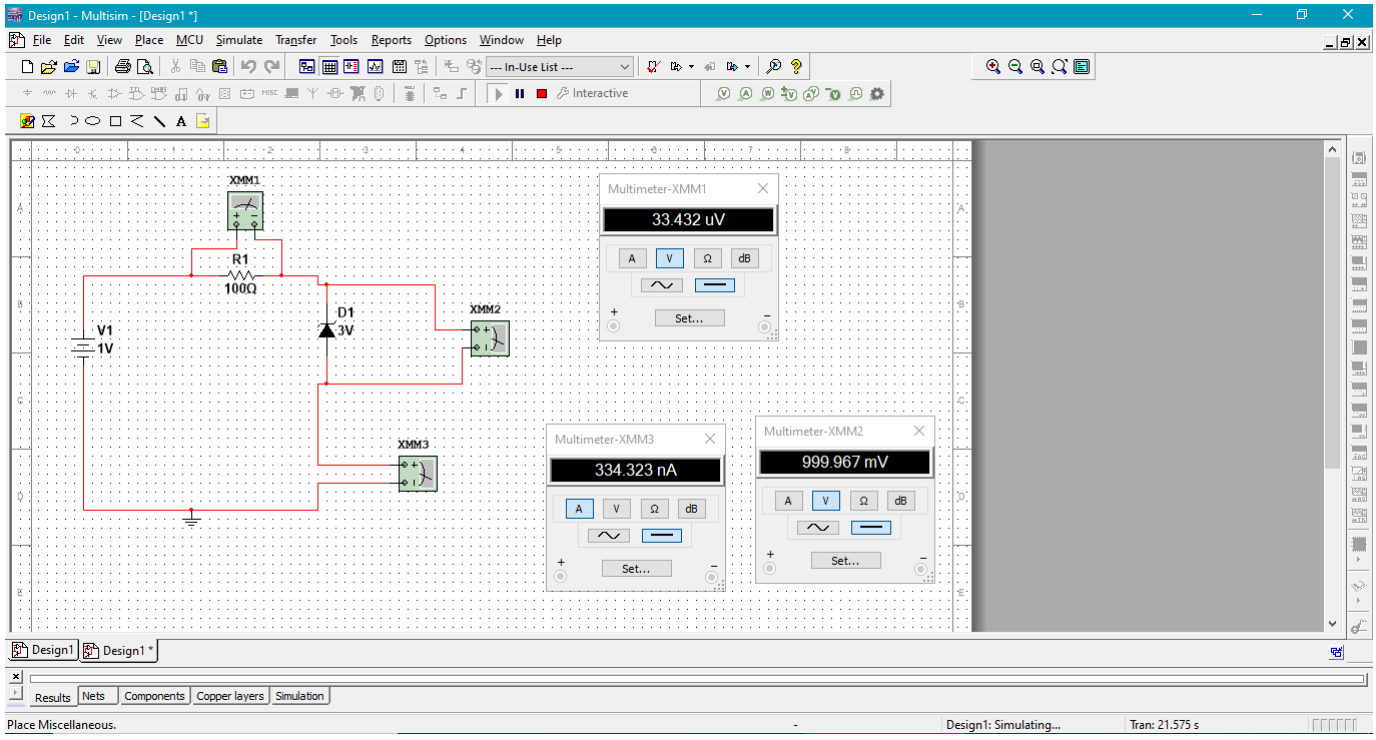
V_S (volt)	V_{R1} (volt)	Vz (volt)	$I_Z = V_{R1} / R_1$ (mA)
0.2	6.687 uV	199.993	66.865 nA
0.6	20.059 uV	599.98 mV	200.594 nA
1.0	33.432 uV	999.967 mV	334.323 nA
3.0	67.735mV	2.932 V	677.35 uA
5.0	2v	3 v	20 mA
7.0	3.986 v	3.014 v	39.862 mA
10.0	6.975 v	3.025 v	69.75 mA
12.0	8.97 v	3.03 v	89.7mA
VZ= ……3 v			

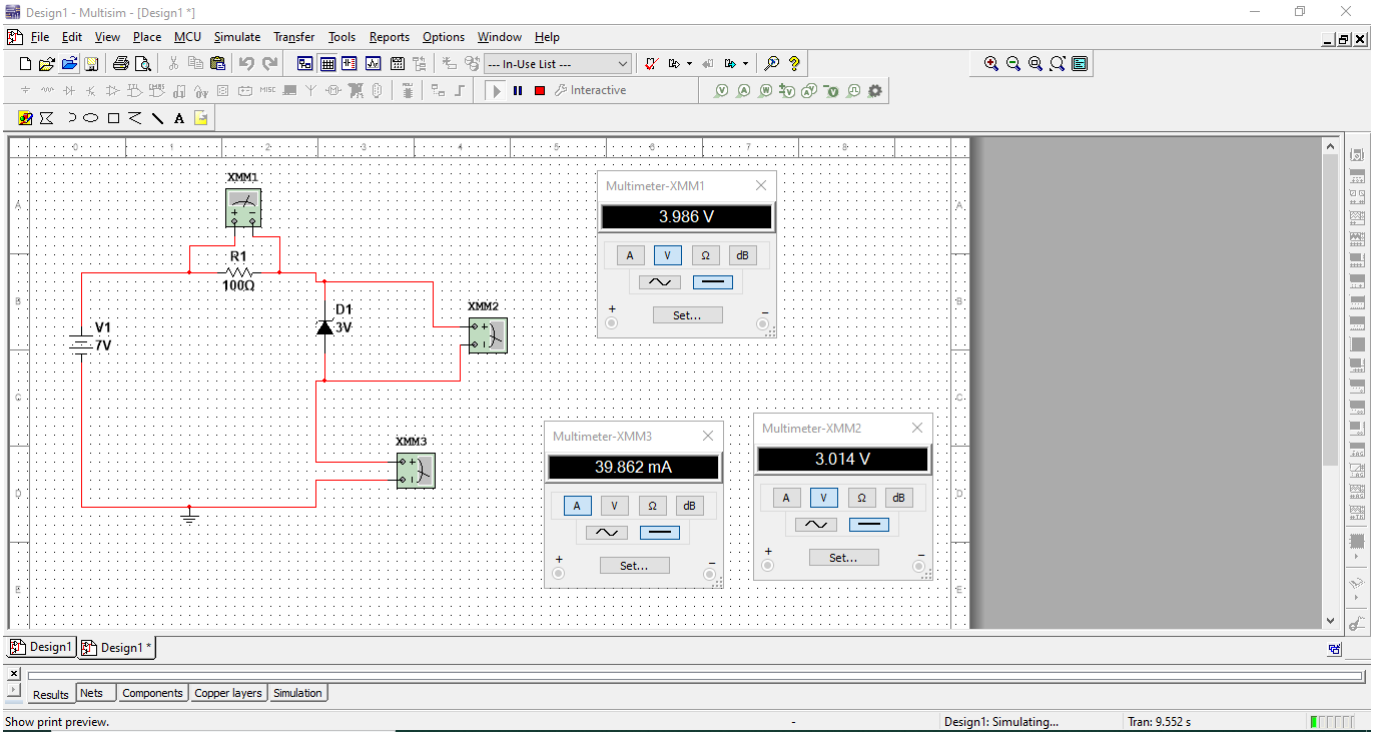
6.Use the values from Table 3 to plot the I_Z versus V_Z curve in Figure 3.

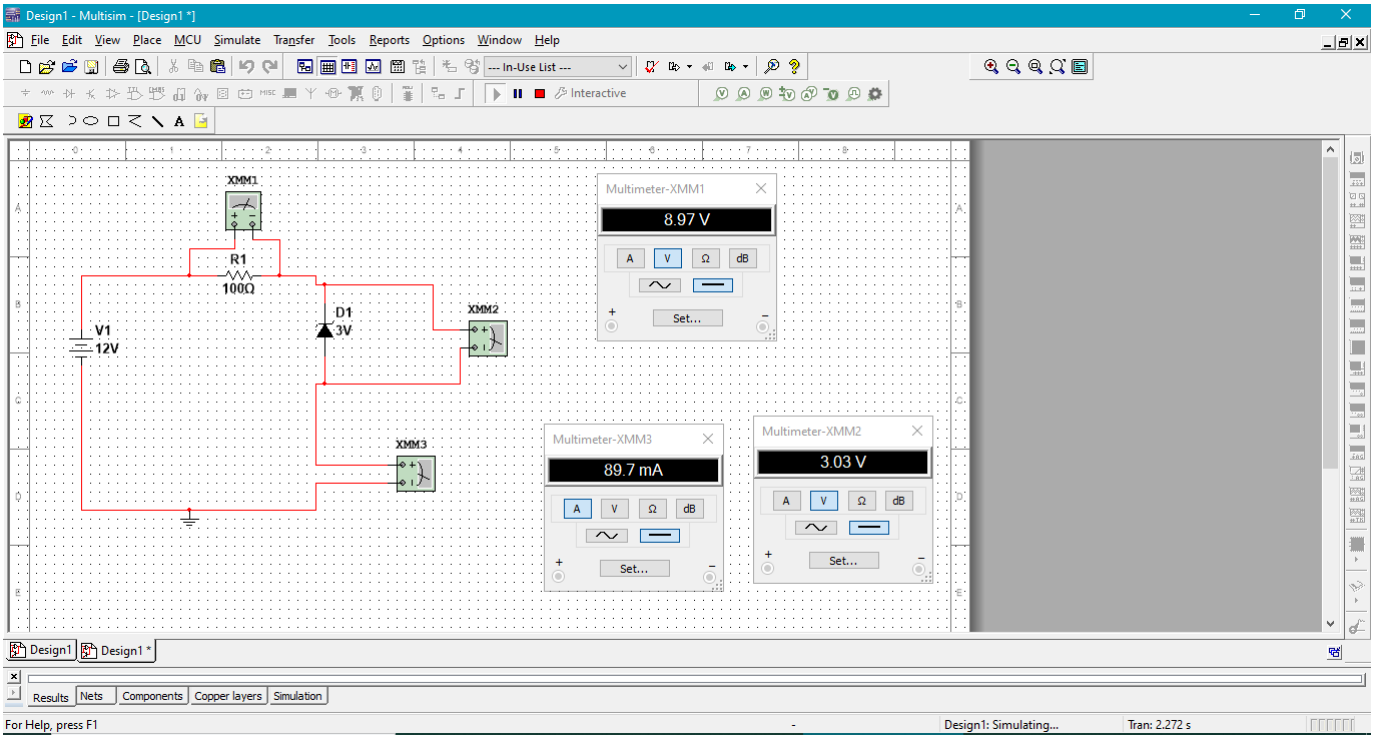


There are some of results in multisim:






Design1 - Multisim - [Design1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In-Use List ---
Interactive
XMM1
R1
100Ω
V1
7V
D1
3V
XMM2
XMM3
Multimeter-XMM1
3.986 V
A V Ω dB
Set...
Multimeter-XMM3
39.862 mA
Multimeter-XMM2
3.014 V
Design1
Design1 *
Results Nets Components Copper layers Simulation
Show print preview.
Design1: Simulating...
Tran: 9.552 s


Design1 - Multisim - [Design1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
--- In-Use List ---
Interactive
XMM1
R1
100Ω
V1
12V
D1
3V
XMM2
XMM3
Multimeter-XMM1
8.97 V
A V Ω dB
Set...
Multimeter-XMM3
89.7 mA
Multimeter-XMM2
3.03 V
Design1
Design1 *
Results Nets Components Copper layers Simulation
For Help, press F1
Design1: Simulating...
Tran: 2.272 s