Lab 7, Diode Characteristics

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Lab Section: E

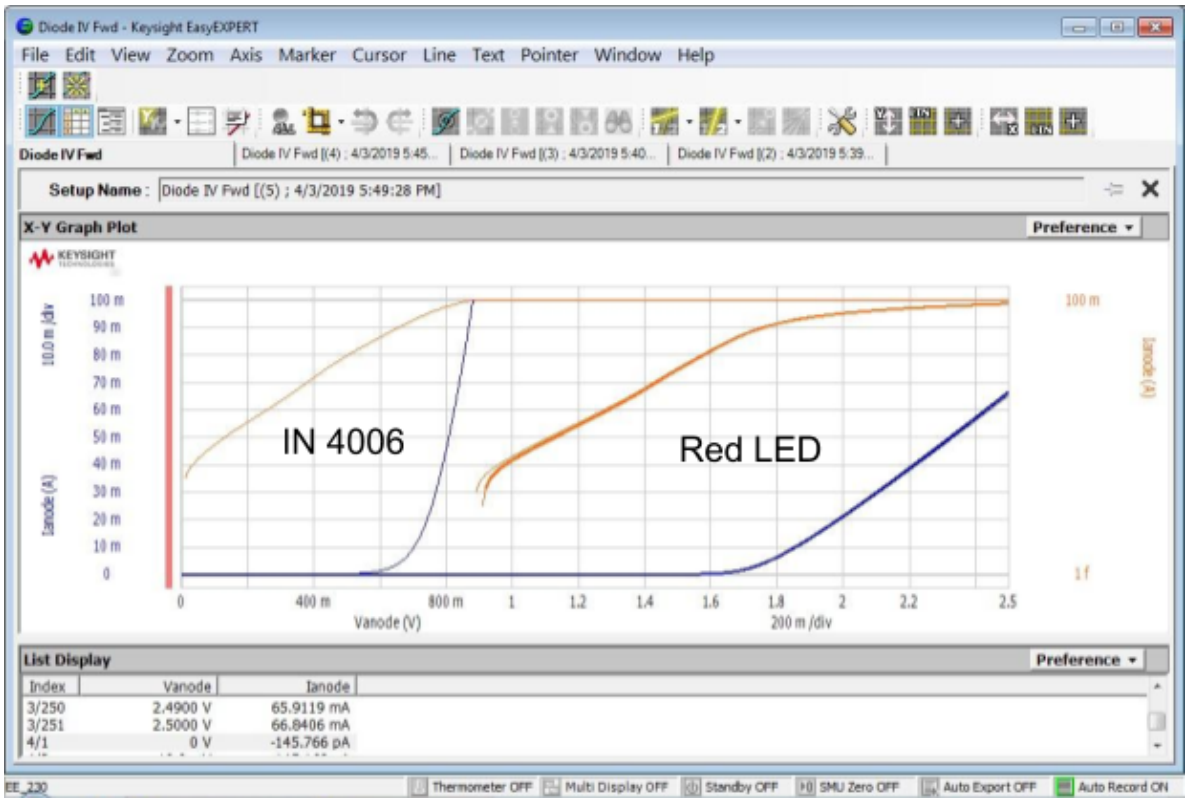
Graded by _____

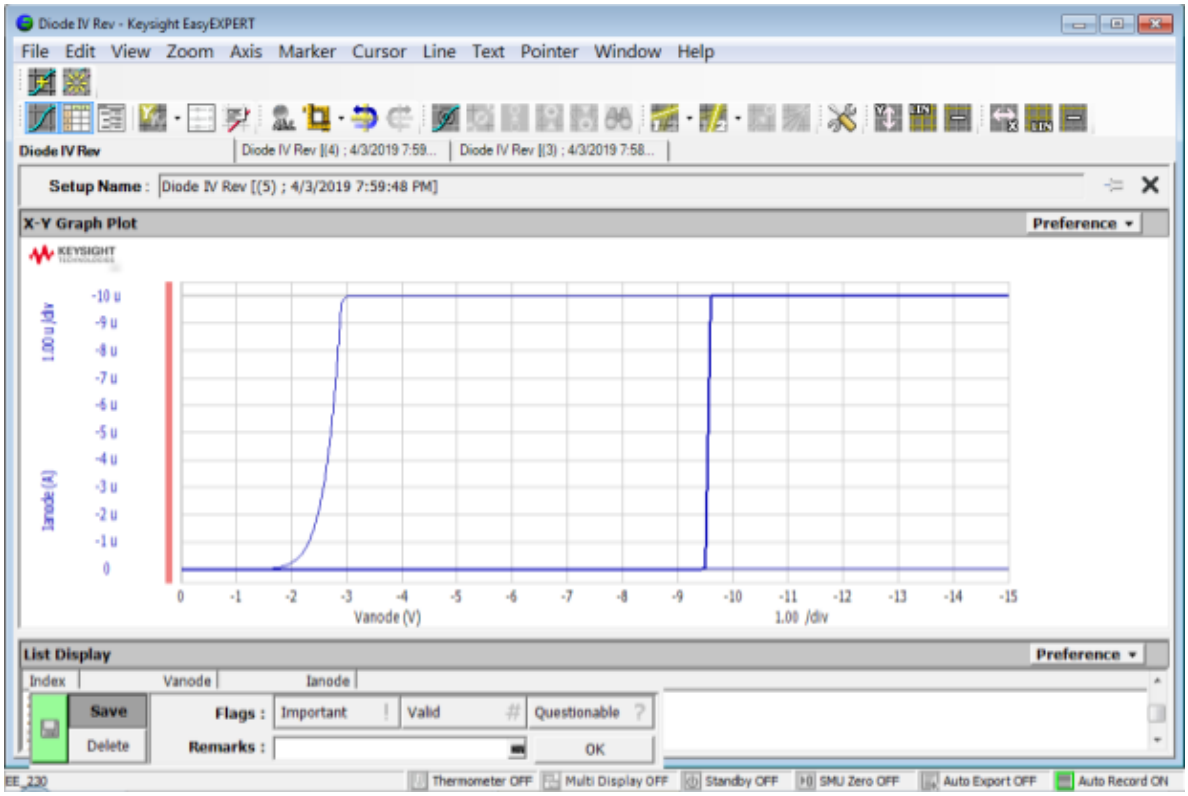
Score _____

Introduction -

This lab focuses on diodes, introducing several specific models and guiding tests to display their properties. The lab asks first to graph the conduction properties of diodes using the parameter analyzer, and then goes on to provide several testing circuits to demonstrate the properties of diodes in real circuits.

A. Diode I-V characteristics with the parameter analyzer





B. Diode I-V characteristics at the lab bench

1N4006 diode -

Vs(V)	v_D	i_D	*Vs(V)*	v_D	i_D
-10	-10	≅0	+3	+.646	.0035
-8	-8	≅0	+4	+.662	.0049
-6	-6	≅0	+5	+.674	.0064
-4	-4	≅0	+6	+.683	.0078
-2	-2	≅0	+7	+.691	.0093
0	+.0044	≅0	+8	+.697	.0108
+1	+.568	.0005	+9	+.703	.0123
+2	+.621	.002	+10	+.708	.0138

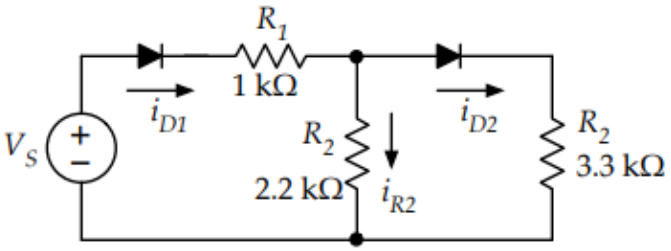
1N733 Zener -

Vs(V)	v_D	i_D	*Vs(V)*	v_D	i_D
-10	-.799	-.0075	-2	-.737	≅0
-9	-.793	-.0061	-1	-.699	≅0
-8	-.788	-.0046	0	+.0043	≅0
-7	-.784	-.0033	+1	+1.0	+.0004
-6	-.778	-.0019	+2	+2.0	+.0018
-5	-.772	-.0008	+3	+3.0	+.0033
-4	-.764	-.0002	+4	+3.8	+.0047
-3	-.753	-.000014	+5	+4.4	+.0062

C.

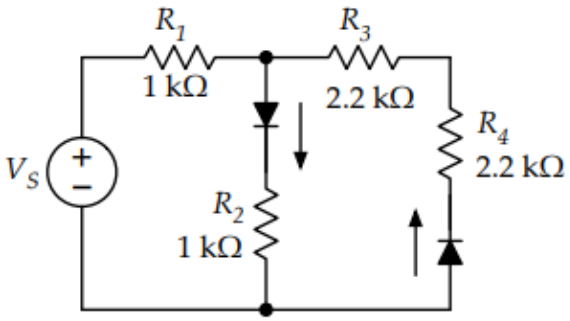
i) V= 1V
i_{D1}= 0.31 mA
i_{D2}= 0 mA

V= 5V
i_{D1}= 1.63 mA
i_{D2}= 0.61 mA

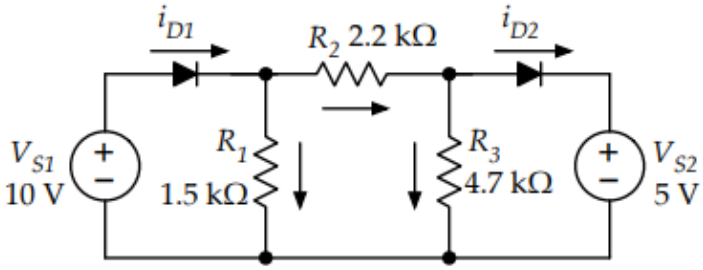


ii) V= +5V
i_{D1}= 2.22 mA
i_{D2}= 0 mA

V= -5V
i_{D1}= 0 mA
i_{D2}= -0.83 mA

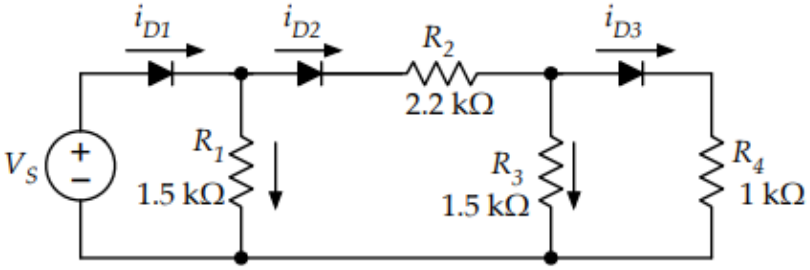


iii) i_{D1}= 8.02 mA
i_{D2}= 0.56 mA
i_{R1}= 6.11 mA
i_{R2}= 1.69 mA
i_{R3}= 1.11 mA



iv) V= 1V
i_{D1}= 0.303 mA
i_{D2}= 0.014 mA
i_{D3}= 0 mA

V= 5V
i_{D1}= 4.16 mA
i_{D2}= 1.19 mA
i_{D3}= 0.49 mA



D.

i) V= 4V

i_{D1}= 0.2 mA

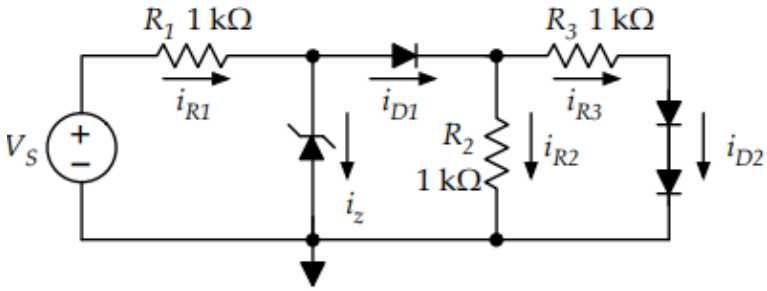
i_{D2}= 0.014 mA

i_{DZ}= 0 A

i_{R1}= 3.2 mA

i_{R2}= 1.5 mA

i_{R3}= .38 mA



V= 8V

i_{D1}= 7.55 mA

i_{D2}= 2.9 mA

i_{DZ}= 4.4 mA

i_{R1}= 2.8 mA

i_{R2}= 4.3 mA

i_{R3}= 3.1 mA

i) V= 8V

i_{R1}= 2 mA

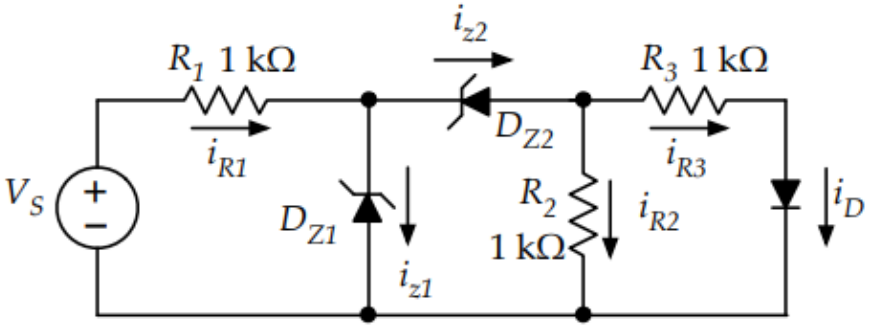
i_{R2}= 1.2 A

i_{R3}= 0.6 mA

i_D = 0.6 A

i_{Z1}= 0 A

i_{Z2}= 4.7 mA



V= 12V

i_{R1}= 4.5 mA

i_{R2}= 2.5 A

i_{R3}= 1.9 mA

i_D = 1.9 mA

i_{Z1}= 0 A

i_{Z2}= 4.5 mA

Conclusion -

This lab was focused mainly on the properties and the usage of several different models of diodes. The beginning of the lab centered around voltage/current graphs of diodes using the parameter analyzer, while the last part of the lab introduced several circuits exploiting the various properties of each model of diode.