EC160 LAB Experiment 2

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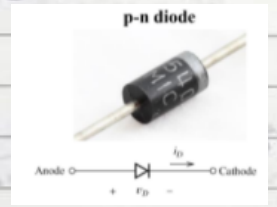
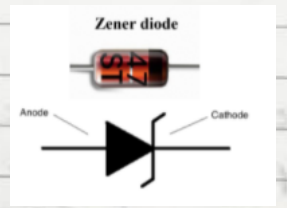
Objective : Study of normal and Zener diode characteristic

Code number of i) Normal diode : 1N4148
ii) Zener diode : EDZV6-2B

Theory : A diode is a non linear circuit element The Symbol of a diode and a real commercial diode :- (generally there is a band marked at its cathode for its identification)

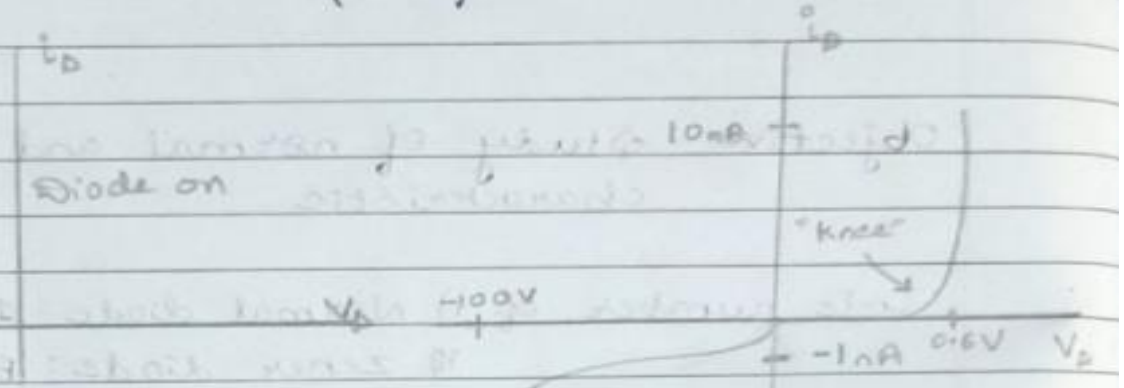




There exists another type of diode known as Zener diode, which has a heavily doped PN junction :-

For diode Current (I_D):

$$I_D = I_S\left(e^{\frac{V_D}{\eta V_T}}\right) - 1$$



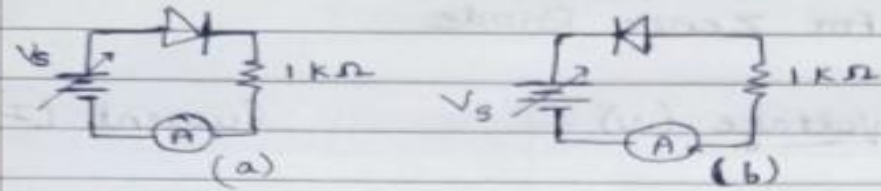
a) Ideal diode characteristic

b) I-V characteristics of a Practical diode

The diode circuits generally operate with varying inputs, which will move the instantaneous operating Pt up and down a region of the characteristics.

r_d (Dynamic or AC Resistance)

$$r_d = \frac{\Delta V_D}{\Delta I_D}$$



(a) → forward bias
(b) → reverse bias

Observations:

Table 1: ~~For~~ Normal Diode

	Applied Voltage (V)	Current (A)
1.	0 V	31.6×10^{-12}
2.	0.1 V	20.12×10^{-9}
3.	0.2 V	205.37×10^{-9}
4.	0.3	1.99×10^{-6}
5.	0.5	160.98×10^{-6}
6.	0.59	1.44×10^{-3}
7.	0.62	2.15×10^{-3}
8.	0.633	2.86×10^{-3}
9.	0.654	4.5×10^{-3}
10.	0.675	6.8×10^{-3}
11.	0.686	8.58×10^{-3}
12.	0.69	9.3×10^{-3}

Normal diode

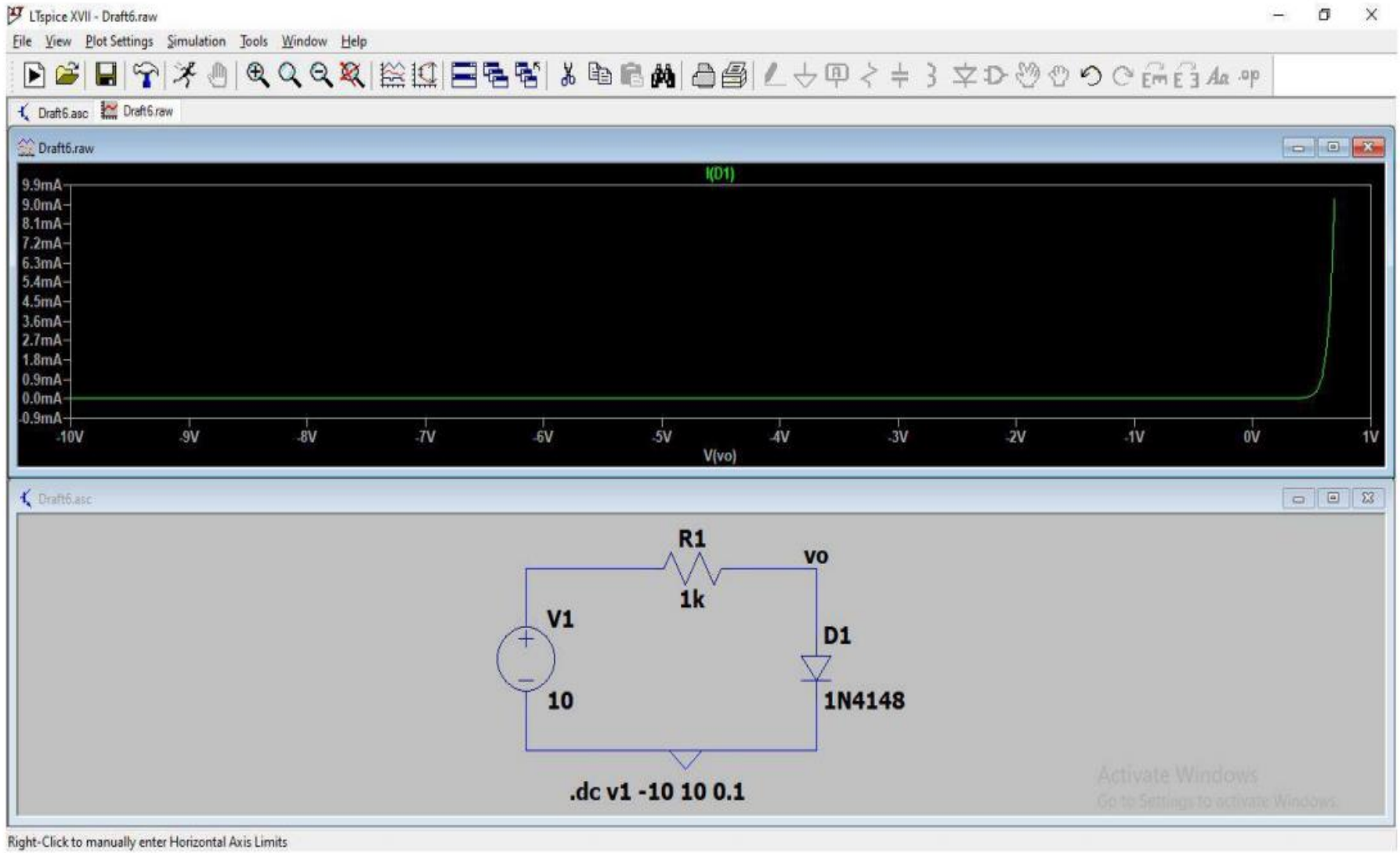


Table 2: For Zener Diode

	Applied voltage (V)	Current (I)
	Forward Bias	
1.	0.0V	66 pA
2.	0.49	28.76 nA
3.	0.74	3.96 nA
4.	0.779	1.139 mA
5.	0.816	4.64 mA
6.	0.835	9.16 mA
	Reverse Bias	
1.	0.8 V	1.6 pA
2.	1.6 V	2.64 pA
3.	3.2V	31.72 pA
4.	5.6	122 nA
5.	6.15	2.3 nA
6.	6.189	1.01 mA
7.	6.191	2.2 mA
8.	6.196	3.805 mA

Zener diode

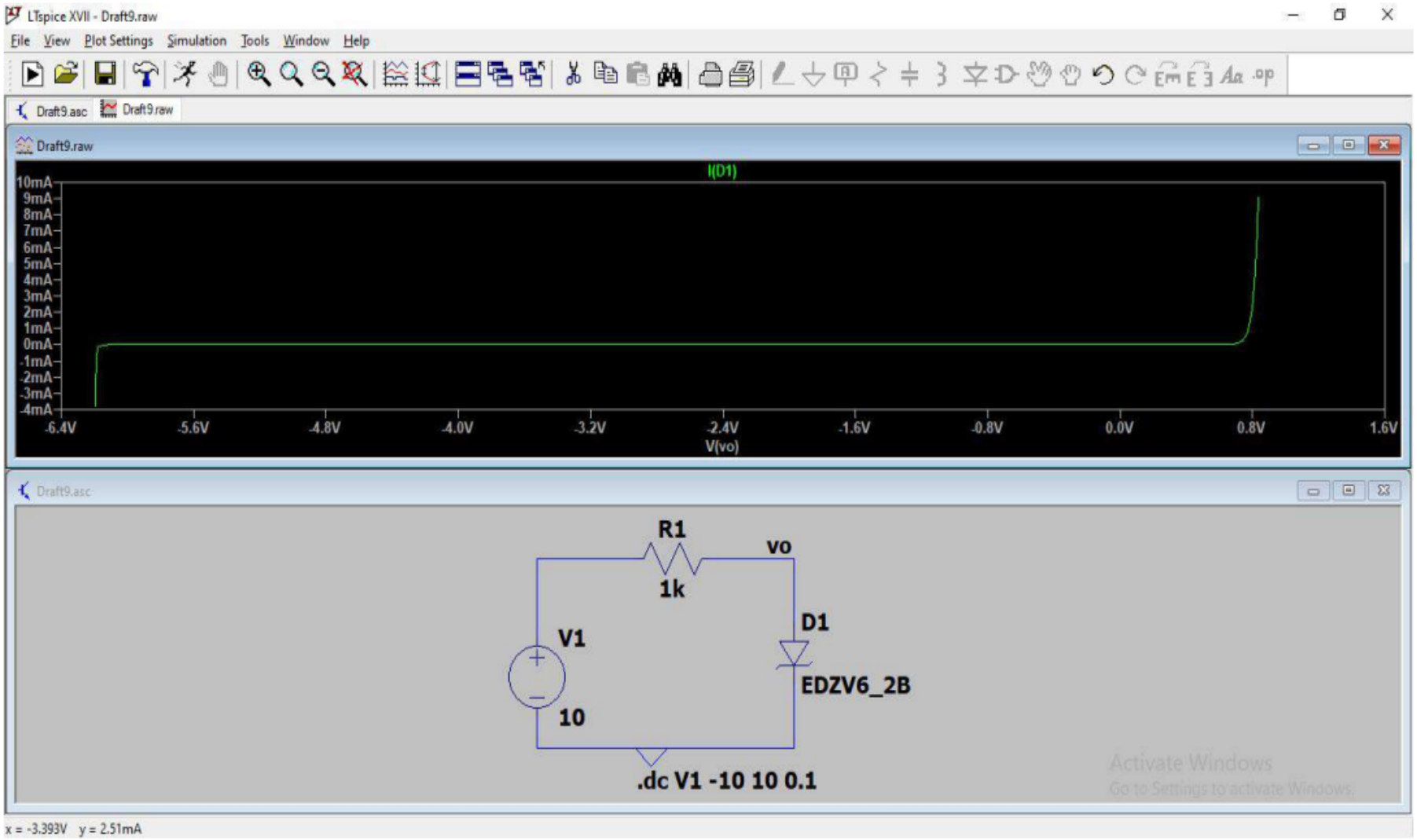

LTspice XVII - Draft9.raw
File View Plot Settings Simulation Tools Window Help
Draft9.asc Draft9.raw
Draft9.raw
I(D1)
10mA 9mA 8mA 7mA 6mA 5mA 4mA 3mA 2mA 1mA 0mA -1mA -2mA -3mA -4mA
-6.4V -5.6V -4.8V -4.0V -3.2V -2.4V -1.6V -0.8V 0.0V 0.8V 1.6V
V(vo)
Draft9.asc
R1
1k
vo
V1
10
D1
EDZV6_2B
.dc V1 -10 10 0.1
Activate Windows
Go to Settings to activate Windows.
x = -3.393V y = 2.51mA

Table 3: Results

1.	Threshold voltage of Normal diode (V)	0.59 V
2.	Static resistance of Normal Diode (Ω)	521 Ω
3.	Dynamic Resistance of Normal Diode (Ω)	29 Ω
4	Threshold voltage of zener Diode (V)	0.779 V
5	Zener breakdown voltage (V)	6.189 V

Thank you