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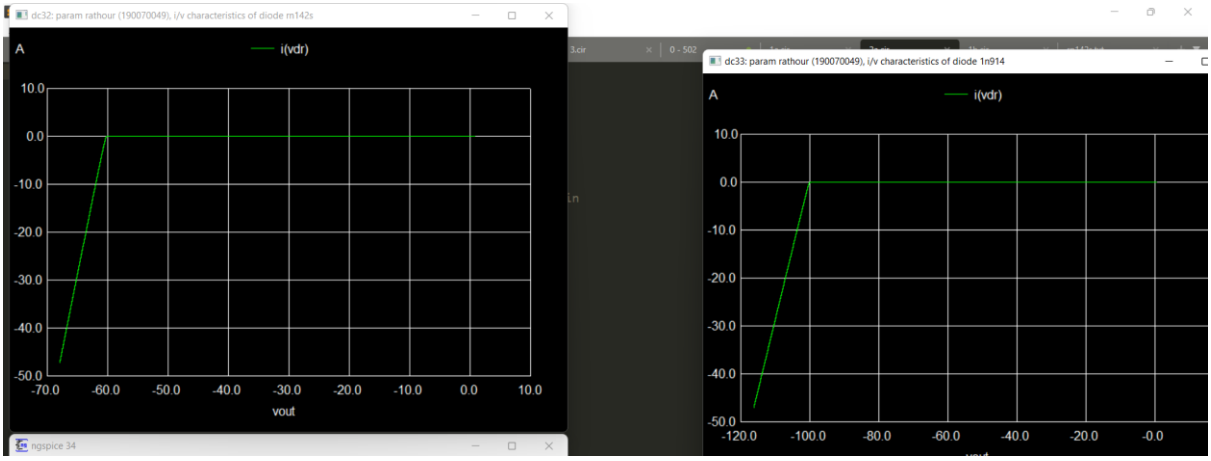
Course: Electronic Devices Lab

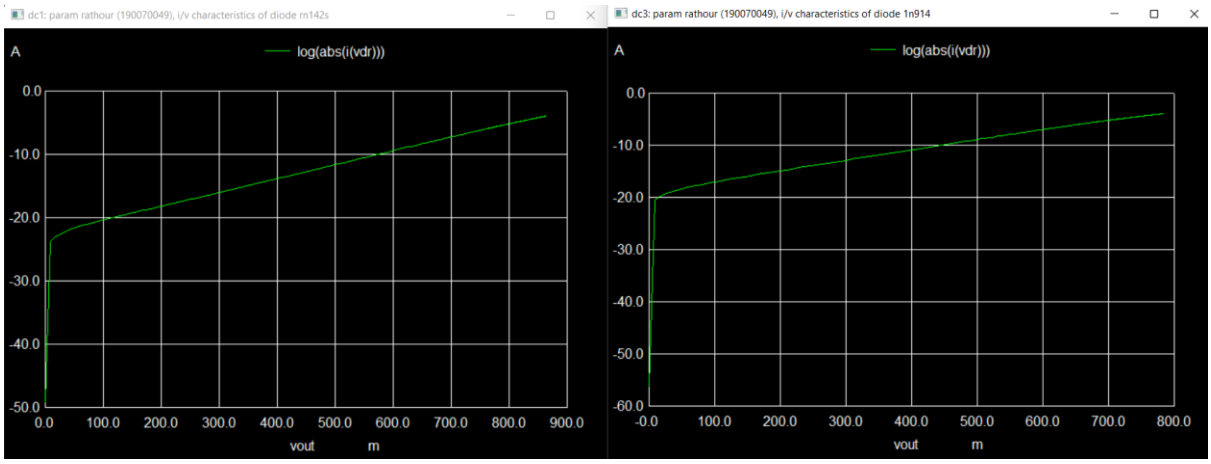
Course Code: EE236

Q1)

RN142S and 1N914



log I-V characteristics of R N142S and 1N914



Using the above,

$$\text{slope} = \frac{\ln I_{D_2} - \ln I_{D_1}}{V_{D_2} - V_{D_1}} = \frac{1}{\eta V_T} \rightarrow \eta = \frac{1}{V_T}\left(\frac{V_{D_2} - V_{D_1}}{\ln I_{D_2} - \ln I_{D_1}}\right)$$

$$I_S = \exp\left(\text{y-intercept}\right)$$

Diode	Forward Voltage (approx) (in mV)	Reverse Saturation Current (in A)	Peak Inverse Voltage (PIV) (in V)	Ideality factor
RN142S	609.8576	1.631057e-10	59.8966	1.771730
1N914	483.8945	7.071515e-09	99.7490	1.985777

Reverse Recovery Time (in seconds)

At

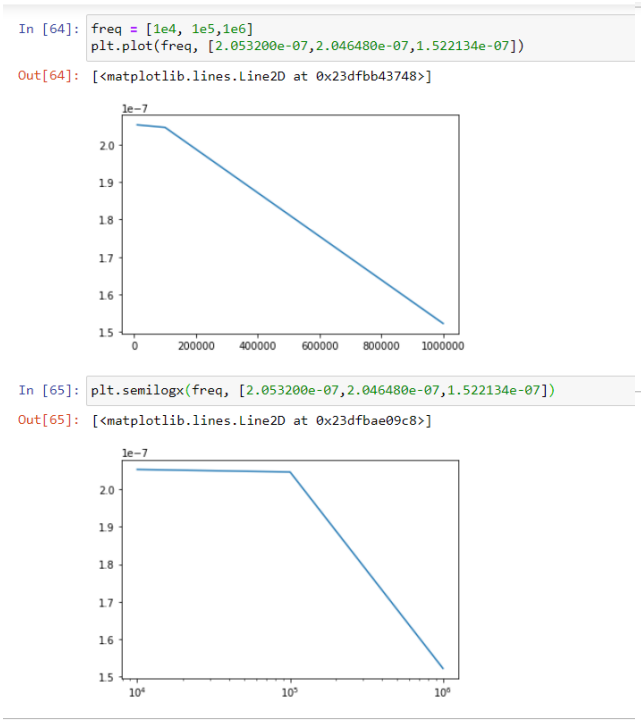
10K = 2.053200e-07

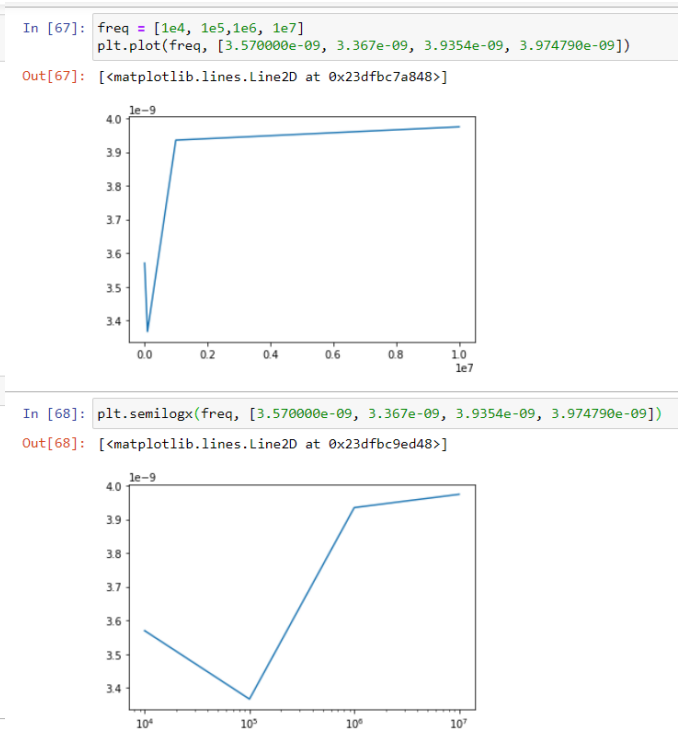
100K = 2.046480e-07

1M = 1.522134e-07

Diode	F = 10KHz	F = 100KHz	F = 1MHz	F = 10MHz
RN142S	2.053200e-07	2.046480e-07	1.522134e-07	No value (couldn't recover)
1N914	3.570000e-09	3.367e-09	3.9354e-09	3.974790e-09

RN142S and 1N914 (x-y and log(x)-y)





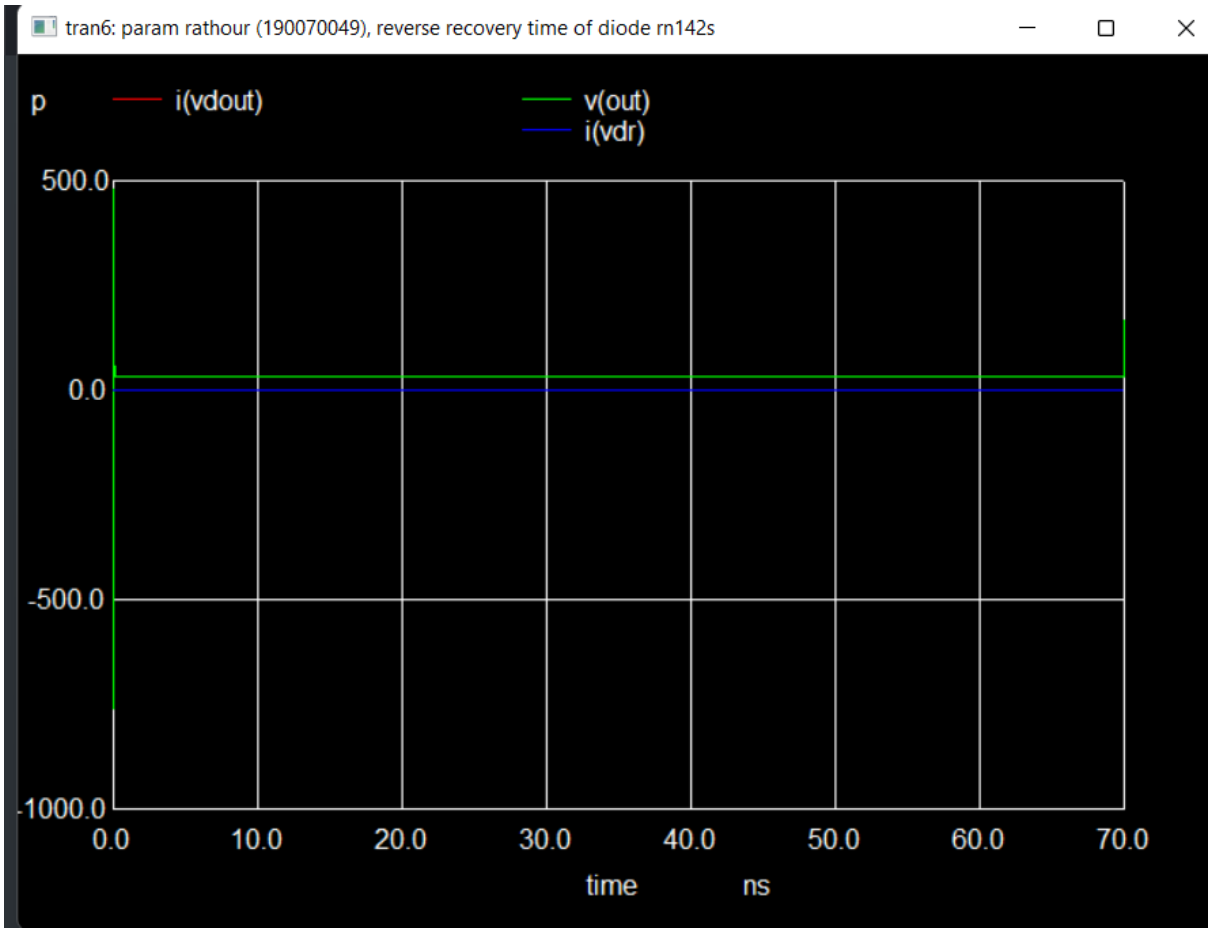
1N914 is better rectifier due to lesser recovery time

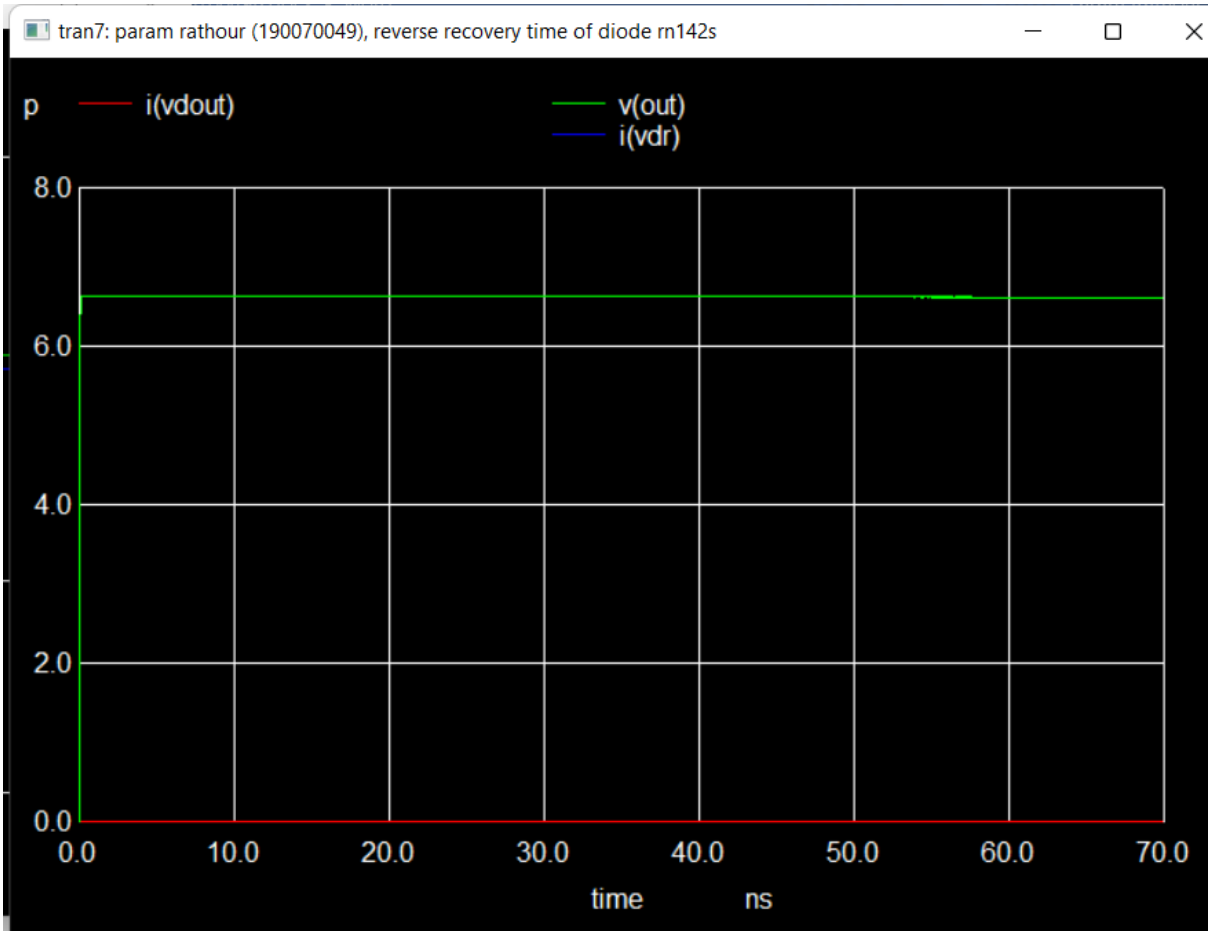
IN914 has the potential of passing major portion of the input signal to the output at 10MHz due to it's small recovery time

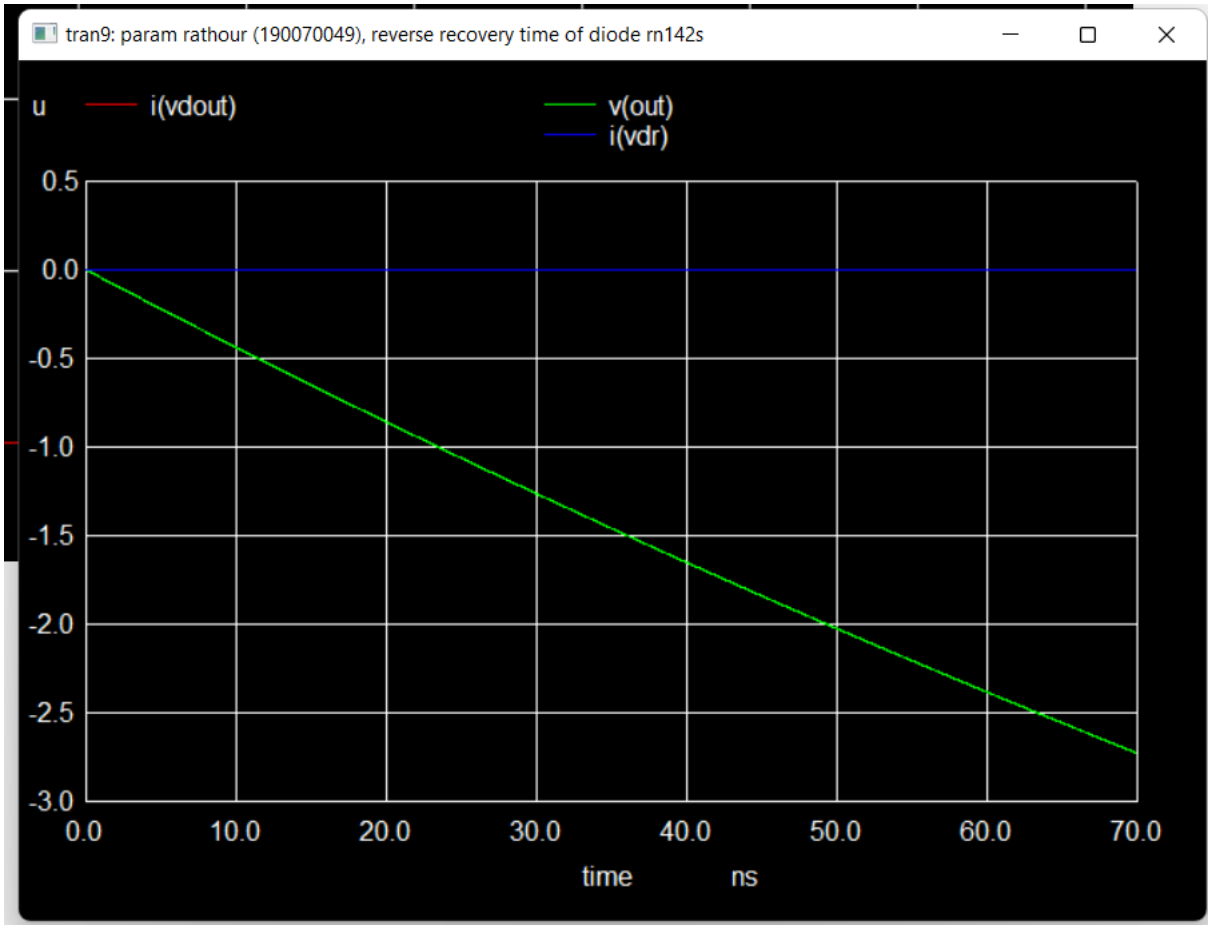
(RN142S couldn't recover it the time period, it acts as a switch)

Q3

Following plots for -5,0,5 bias




tran7: param rathour (190070049), reverse recovery time of diode rn142s
p
i(vdout)
v(out)
i(vdr)
8.0
6.0
4.0
2.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
time
ns


tran9: param rathour (190070049), reverse recovery time of diode rn142s
u
i(vdout)
v(out)
i(vdr)
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
time
ns