Title of the experiment:

VOLTAGE CONVERTER TO A STABLE +5V OUTPUT USING ESIM .

Theory:

This circuit is a Fixed Linear Voltage Regulator designed to convert a high DC input voltage into a stable +5V output. It utilizes the LM7805 IC, which employs internal current limiting, thermal shutdown, and safe-area compensation. The input capacitors (C1, C2) filter high-frequency noise and stabilize the input, while the output capacitors (C3, C4) improve the transient response and ensure a ripple-free DC output. A Schottky diode (D1) is included for reverse-polarity protection.

Schematic Diagram:

The circuit schematic of the Fixed linear voltage Regulator in eSim is as shown below:

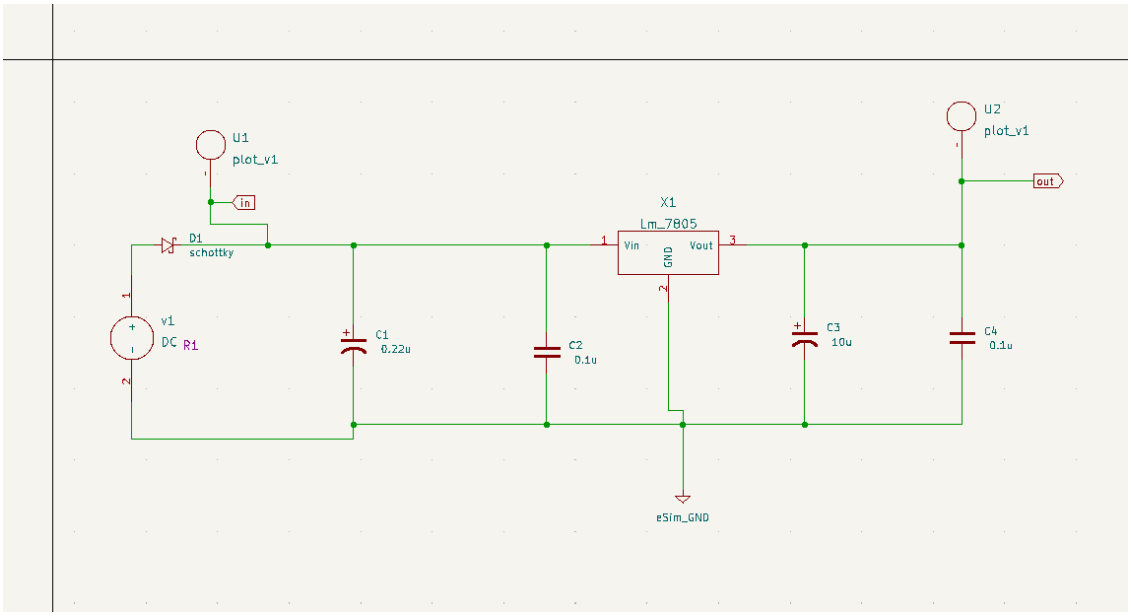

Figure 1: schematic capture of classical voltage converter

Simulation Results :

1. Ngspice Plots (NOTE: I have zoomed enough like decimal in the ngspice so the graph makes the circuit looks screaming of noise, but it's working. For a very stable output, we can increase the value of frequency, high filter capacitance C4)

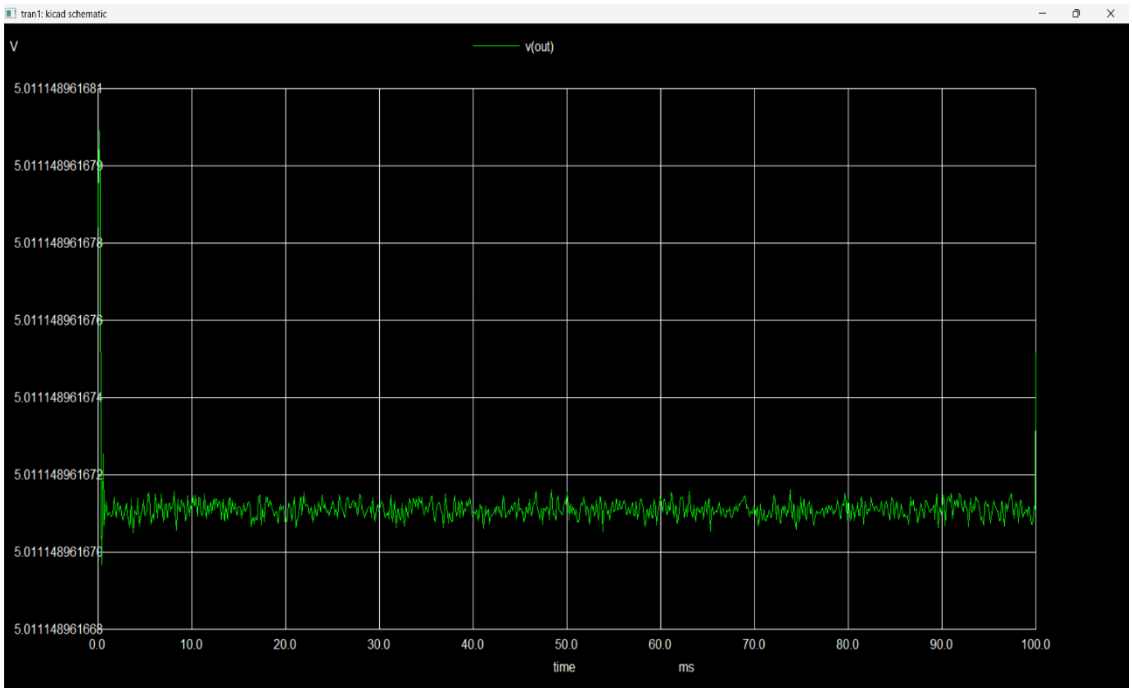

Figure 2: Ngspice Input Plot

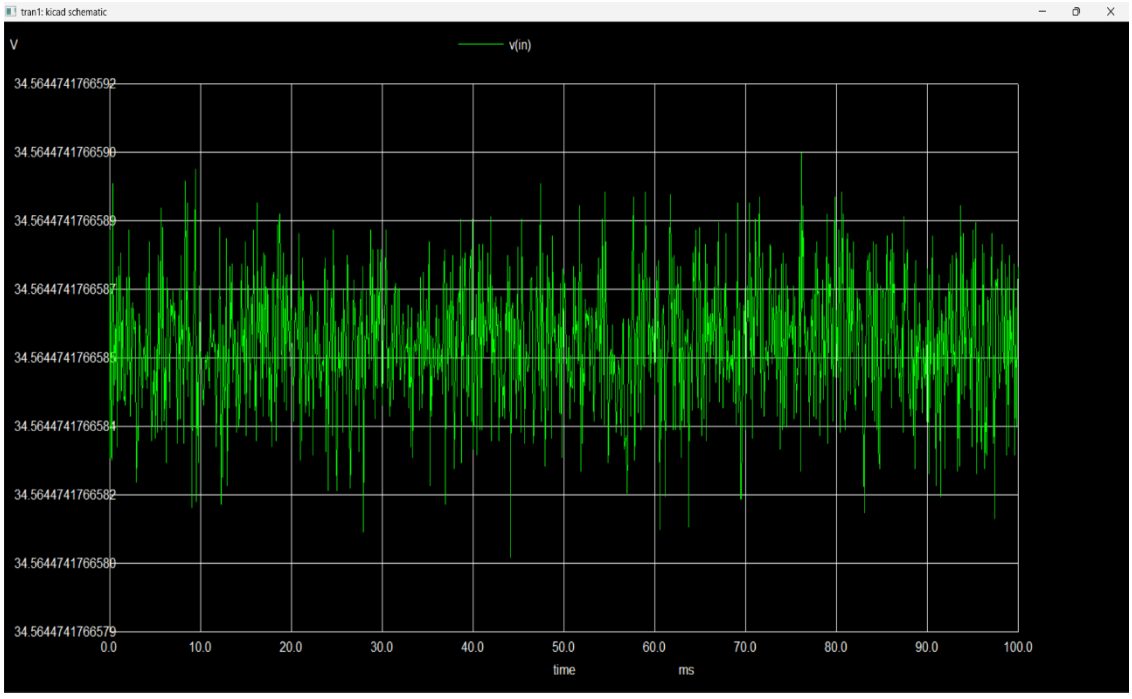

Figure 3: Ngspice Output

2. Python Plots:

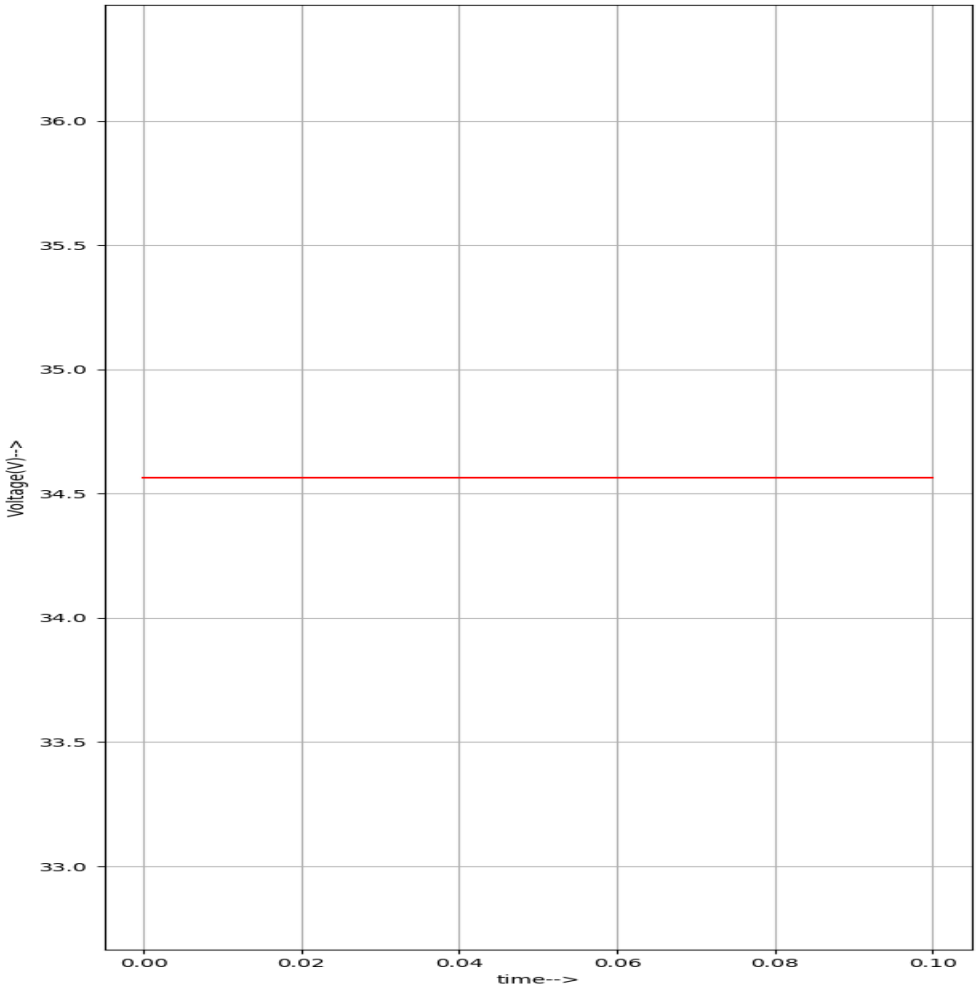

Figure 4: Python Plot Input +35V but explanation in the figure 5 below.

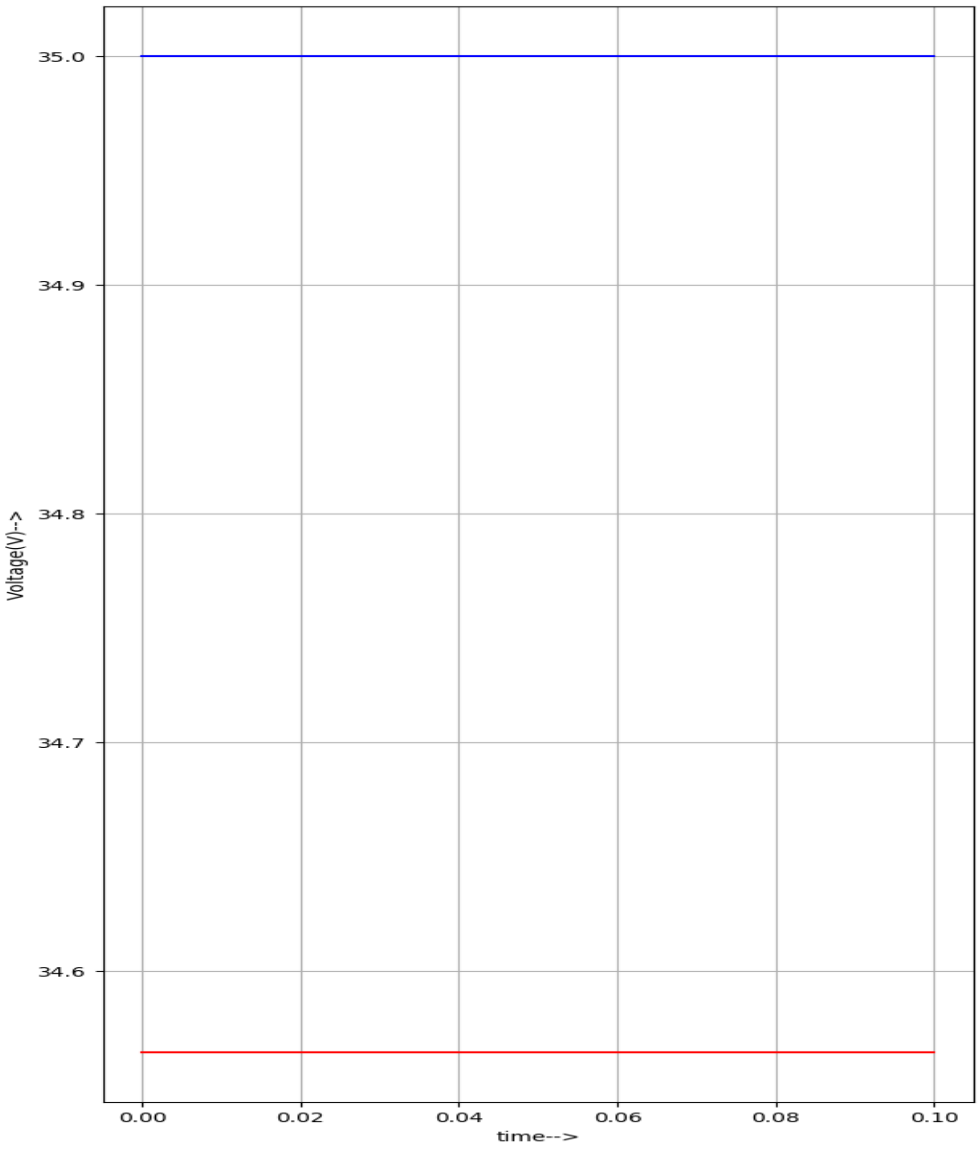

Figure 5: output at node (NOTE: WE CAN SEE HERE THE INPUT VOLTAGE IS +35V BUT IN THE INPUT IS SHOWS APROXX~34.7 V THIS IS DUE TO THE DIODE(D1). YOU CAN SEE THAT I PLACED THE PLOT_V1 AFTER THE DIODE TO SHOW THE VOLTAGE DROP)

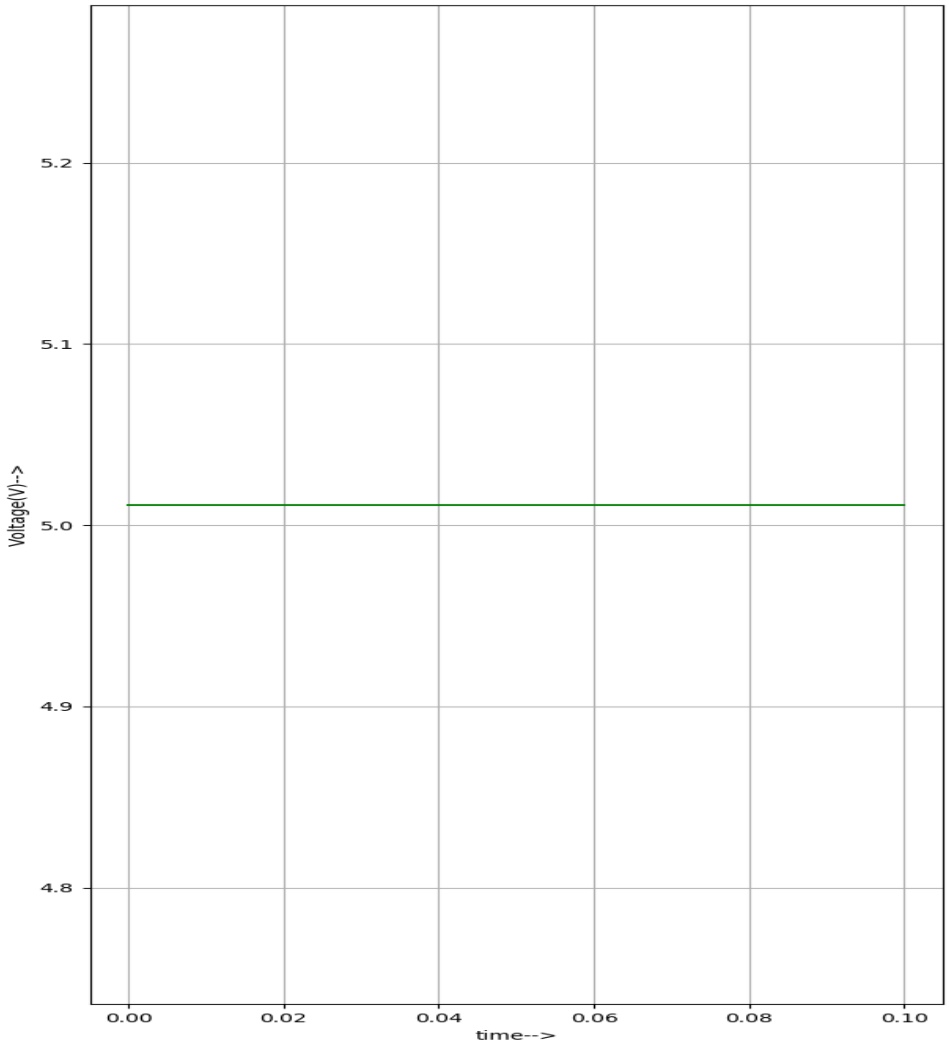

FIGURE 6: python plot output +5V

Conclusion :

Thus, we have studied the a Fixed Linear Voltage Regulator designed to convert a high DC input voltage into a stable +5V output circuit

References :

https://www.circuits-diy.com/12v-to-5v-converter-using-lm7805-ic-power-supply/