23ECE185: ELECTRONIC DEVICES AND CIRCUIT

END SEMESTER PROJECT

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1.Abstract:

This report presents the development and assessment of a voltage regulator utilizing a 3.6 V Zener diode, aimed at stabilizing a 4.1 V output from a 6-8 V rectified pulsating DC source. The project focused on creating a circuit design that ensures it have a load resistance and a capacitor for reduce the ripple voltage to get a stable output of 4.1V . Through component selection and systematic layout planning, the circuit achieves the desired voltage regulation and load current between 0-70mA.

2.Introduction:

- A voltage regulator keeps the voltage steady, even if the input voltage or the amount of power being used changes. Voltage regulators ensure that electronic devices receive a consistent and reliable voltage supply. They protect devices from damage due to voltage fluctuations or spikes in the power supply.
- In this project we have created a design for voltage regulator using 3.6V Zener diode to provide a constant voltage of 4.1V, using a rectified pulsating dc between 6V and 8V with load current drawing any current from 0-70mA.

3.Objective:

The main objective of the project is to design a voltage regulator to provide a constant voltage of 4.1V and load current between 0-70mA.

From this project we can learn about

1. The characteristics of the voltage regulator and observe the graphs constant supply voltage without using a transformer.
2. Verifying the various conditions (different input values) in the designed circuit and plotting the required voltage and load current graph.

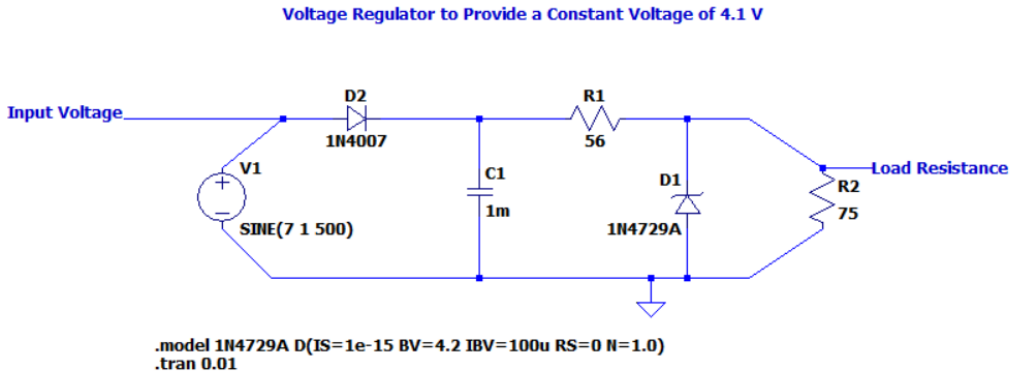
4.Components Required:

Table 1: list of components

S.no	Components	Specification	Quantity
1.	Power Supply	-	1
2.	Zener Diode	1N4729	1
3.	Diode	1N4007	1
4.	capacitor	1m	1
5.	**E24** Series Resistor	56Ω	1
		75Ω	1

5.Design:

Fig 1. Voltage Regulator Circuit without using a Transformer



Circuit Design Overview:

1. Sine wave is given as input with dc offset of 7 with Amplitude of 1V and Frequency 500Hz.

2. In this circuit the capacitor is added parallel to input to reduce the ripple voltage

caused and smooth the output current or voltage.

3. 56Ω resistor acts series resistance limits the current for safe operation of Zener voltage and 75Ω resistor is used as load resistance.
4. 1N4007 diode is used to rectifier and 1N4729 diode is used for calculation of output voltage.
5. The graphs are analyzed at transient condition. The voltage and load current are observed with the cursor in graph.

6.Result:

Fig 2. Input voltage waveform

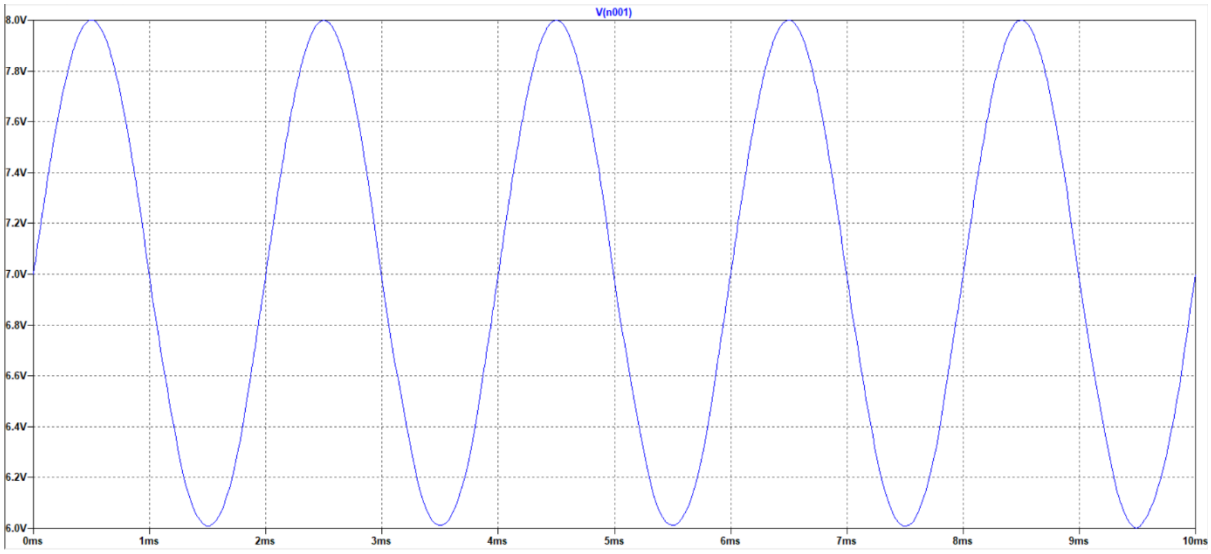


Fig 3. Output voltage waveform

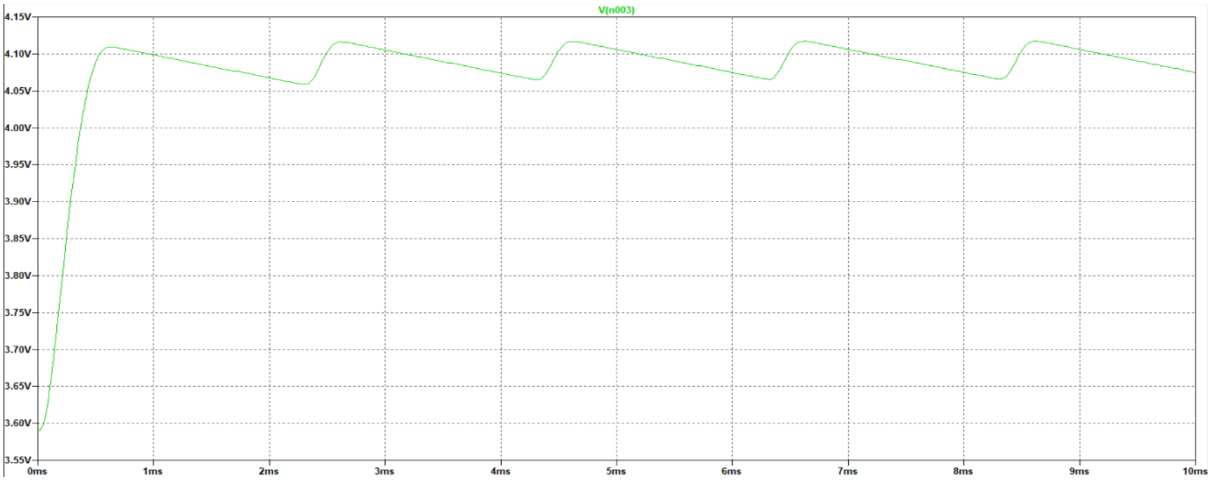
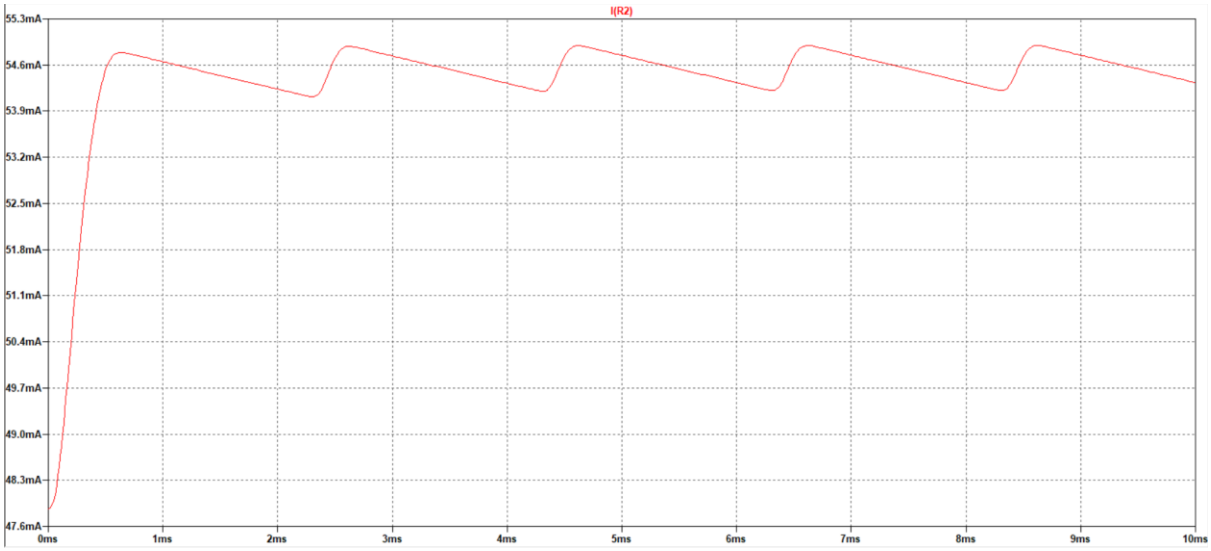


Fig 4. Load current waveform



Observation:

1. From the Fig 2. We can that the ac sine wave is pulsating from 6V to 8V.
2. From the Fig 3. We can observe that the constant 4.1V output voltage is obtained. Since the capacitor is used for smoothening the output is reflecting some ripple over the output.
3. From the Fig 4. We observe that the expected load current has been observed between 0-70mA.

   Table 2: Voltage regulator characteristics

Input Voltage(V_{in})	**Output Voltage (V_{out})**		**Load Current**
Input	Expected output	Obtained output	Output
6V	4.1V	4.080V	53.80mA
7V	4.1V	4.096V	54.02mA
8V	4.1V	4.102V	54.88mA

4. From the table we observe that we obtained the required voltage (4.1V) and load current (0-70mA) accordingly.

Conclusion:

1. The voltage regulator circuit, incorporating a Zener diode and capacitor for ripple reduction and stability, effectively maintains a constant 4.1 V output within a wide input voltage range (6-8 V) and varying load currents (0-70 mA).
2. By choosing the right parts and setting up the circuit correctly, we ensure that the voltage regulator works well even if the input voltage and load change, making it dependable in different situations.
3. The successful functioning of this voltage regulator emphasizes the importance of capacitors and Zener diodes in voltage regulation circuits. They ensure a stable power supply for electronic devices.

Overall, the voltage regulator meets the project objectives and provides a solid foundation for further research and enhancement in voltage regulator circuit design.