PRINCIPLES OF ELECTRIC AND ELECTRONICS COURSE APPLICATION PROJECT REPORT

PROJECT TITLE: POWER SUPPLY WITH LM317

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Introduction:
This report details the construction and testing of a variable power supply using the LM317 adjustable voltage regulator. The project involves converting a 220V AC input to a regulated DC output, which can be adjusted using a potentiometer. The power supply is built on a breadboard and tested with an oscilloscope and a digital multimeter.

Materials
Transformer (220V input and 24V output)
Voltage Regulator: 1 LM317
Diodes: 6 Pieces 1N4001 (only four were used)
1 Piece 10KΩ multi-turn potentiometer
Capacitors:
- 1 Piece 1000µF, 50V
- 1 Piece 10µF, 35V

Resistors:
- 1 Piece 500Ω, 0.25W (R2)
- 1 Piece 2.2KΩ, 0.25W (R1)

Fuse: 1 Piece 1A fuse, with fuse holder
1 LED
1 Cooler for LM317
1 Meter 3x2.5mm stranded cable
1 Grounded plug
1 Box for power supply (optional)
Additional Components:
- D1, D2, D3, D4, D5, D6 = 1N4001 diodes
- Breadboard for circuit assembly

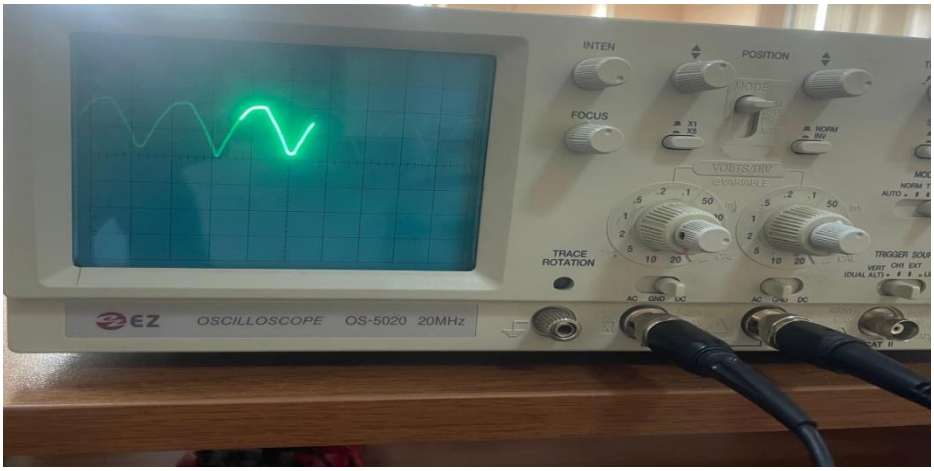
Circuit Description
The circuit was assembled on a breadboard with the following main stages:

1. Transformer: Steps down the voltage from 220V AC to 24V AC.
2. Rectifier: Converts AC to pulsating DC using a bridge rectifier formed by four 1N4001 diodes.
3. Smoother (Capacitor): Smoothens the pulsating DC using a 1000µF electrolytic capacitor.
4. Regulator (LM317): Provides a stable and adjustable DC output. The output voltage is adjusted using a 10KΩ potentiometer.

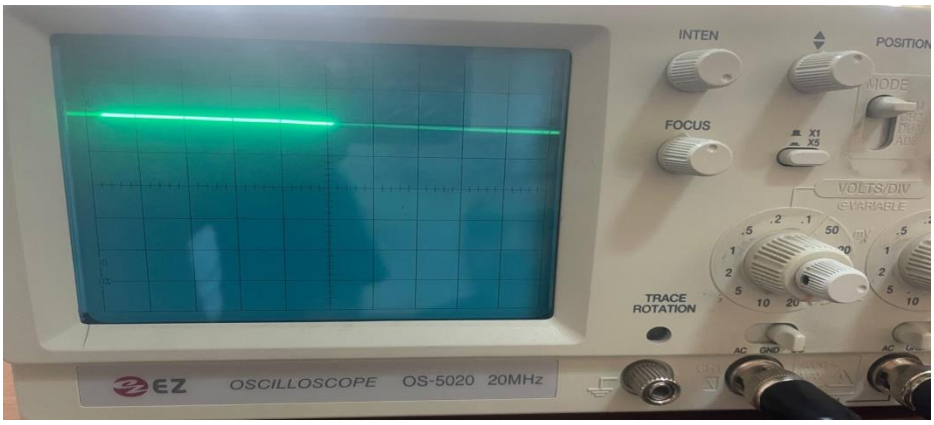
Testing Steps

1. Transformer: Connected the transformer to the 220V AC mains and measured the output to ensure it steps down to 24V AC.
2. Rectifier: Built the bridge rectifier using four 1N4001 diodes. Verified the rectified output using an oscilloscope.
3. Smoother (Capacitor):

-Without Capacitor: Observed the rectified output waveform on the oscilloscope.



- With Capacitor: Added the 1000µF capacitor across the output and observed the smoothed DC output on the oscilloscope.



4. Regulator (LM317): Connected the LM317 regulator circuit with the 10µF capacitor (C2), resistors (R1), and the potentiometer (P1) for voltage adjustment. Verified the regulated and adjustable output using a multimeter.

Challenges Faced

1. Open Circuit on Breadboard: Encountered an open circuit issue on the breadboard. Resolved it by using a jumper wire to establish the connection.

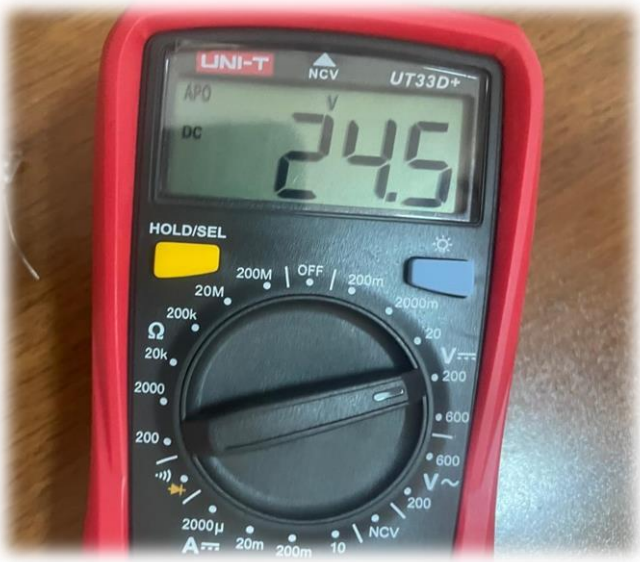
2. Faulty LED: The initial LED did not work. Replaced it with a new LED to ensure proper operation.

Conclusion

The power supply circuit was successfully constructed and tested. The use of the LM317 regulator allowed for a stable and adjustable DC output, which was verified through measurements with an oscilloscope and a multimeter. Despite minor challenges such as open circuits and a faulty LED, the project was completed successfully.

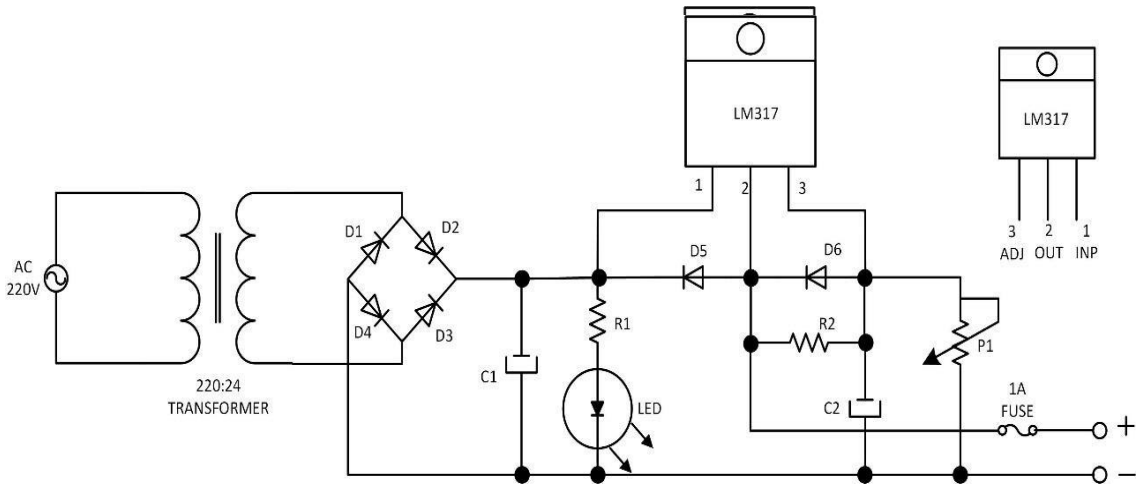
Appendices

Output DC Voltage Measurement with variable resistor (potentiometer)

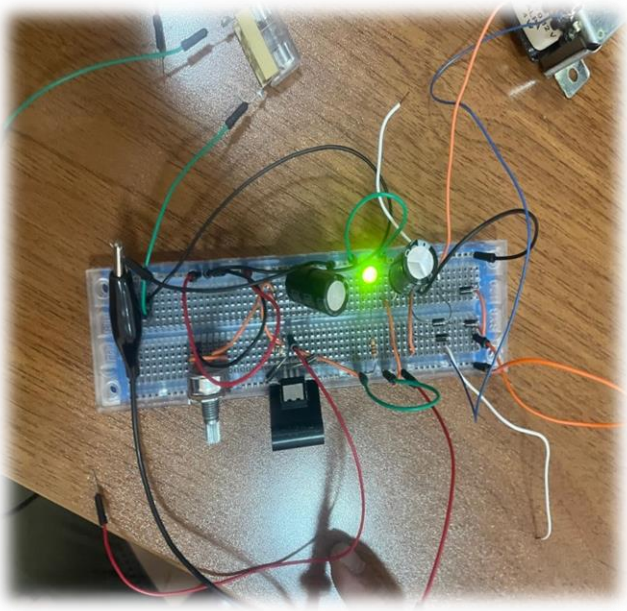


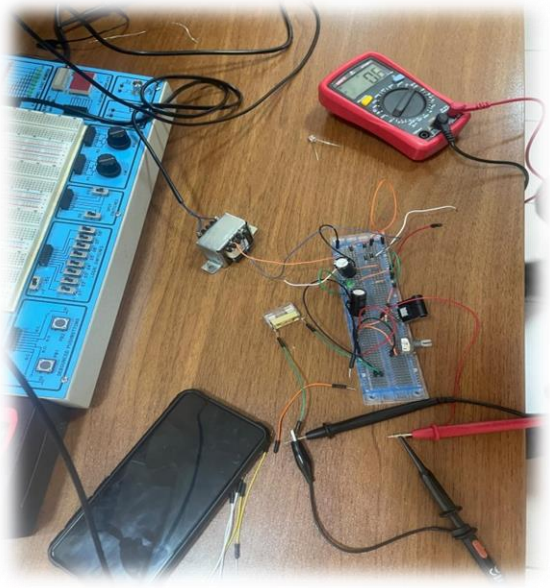
References

- LM317 Datasheet



Additional Pictures of the project





This report provides a detailed account of the power supply project, covering materials used, circuit description, testing procedures, challenges faced, pictures, and final conclusions.