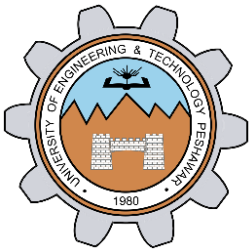
Lab Report - 07

Zener Diode Characteristics



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Class Section: **A**

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Submitted to:

Engr. Usman Malik

Month Day, Year (15 05, 2024)

Department of Computer Systems Engineering

University of Engineering and Technology, Peshawar

Experiment No. 7: Zener Diode Characteristics

Objectives:

- To study the characteristics of Zener diode.
- To study the voltage regulation in Zener diode regulation circuit.

Equipment:

- Oscilloscope
- Function Generator
- Digital Multimeter (DMM)

Components Diode: Silicon (D1N4002) Resistors: 100Ω Potentiometer Variable Voltage Source

Theory:

Diode: A diode is a two-terminal electronic component that conducts current primarily in one direction; it has low resistance in one direction, and high resistance in the other.

Zener diode:

Zener diode is a P-N junction diode specially designed to operate in the reverse biased mode. It is acting as normal diode while forward biasing. It has a particular voltage known as break down voltage, at which the diode break downs while reverse biased. In the case of normal diodes the diode damages at the break down voltage. But zener diode is specially designed to operate in the reverse breakdown region.

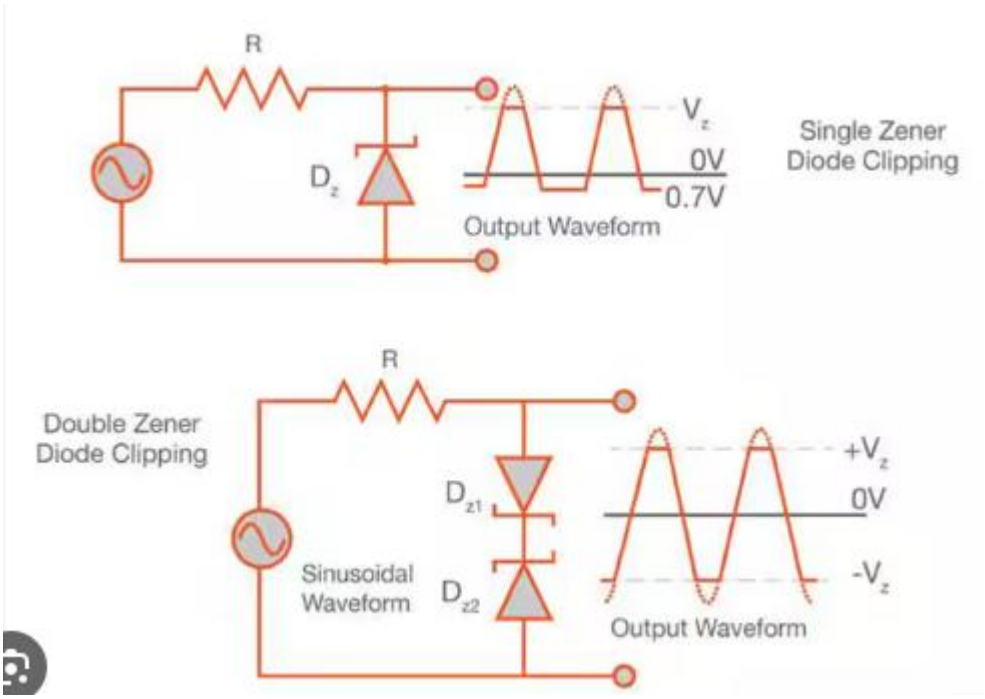
The basic principle of zener diode is the zener breakdown. When a diode is heavily doped, it's depletion region will be narrow. When a high reverse voltage is applied across the junction, there will be very strong electric field at the junction. And the electron hole pair generation takes place. Thus heavy current flows. This is known as Zener break down.

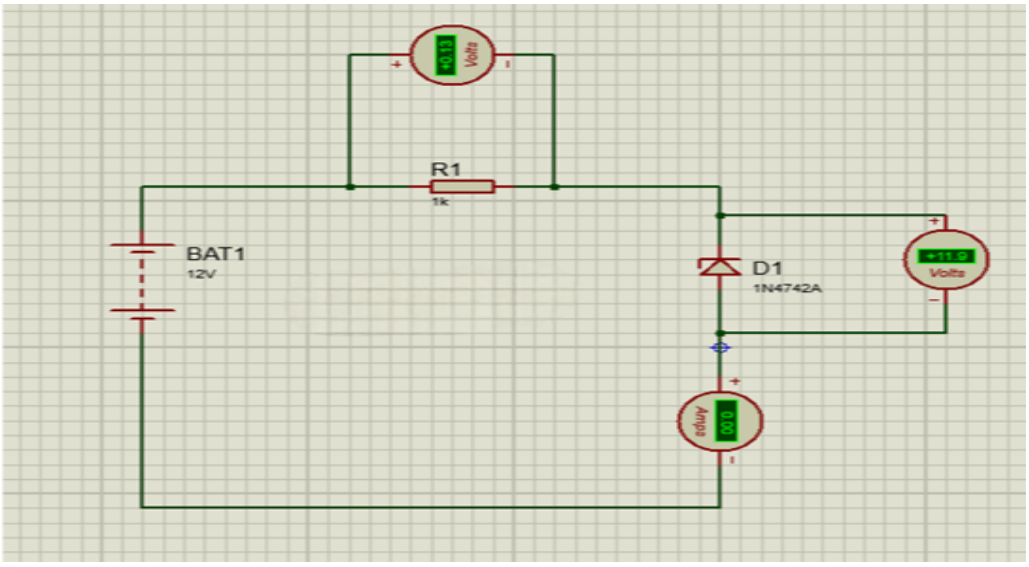
So a zener diode, in a forward biased condition acts as a normal diode. In reverse biased mode, after the break down of junction current through diode increases sharply. But the voltage across it remains constant.

Procedure:

Part A: Zener Diode Characteristics

- Construct the circuit .





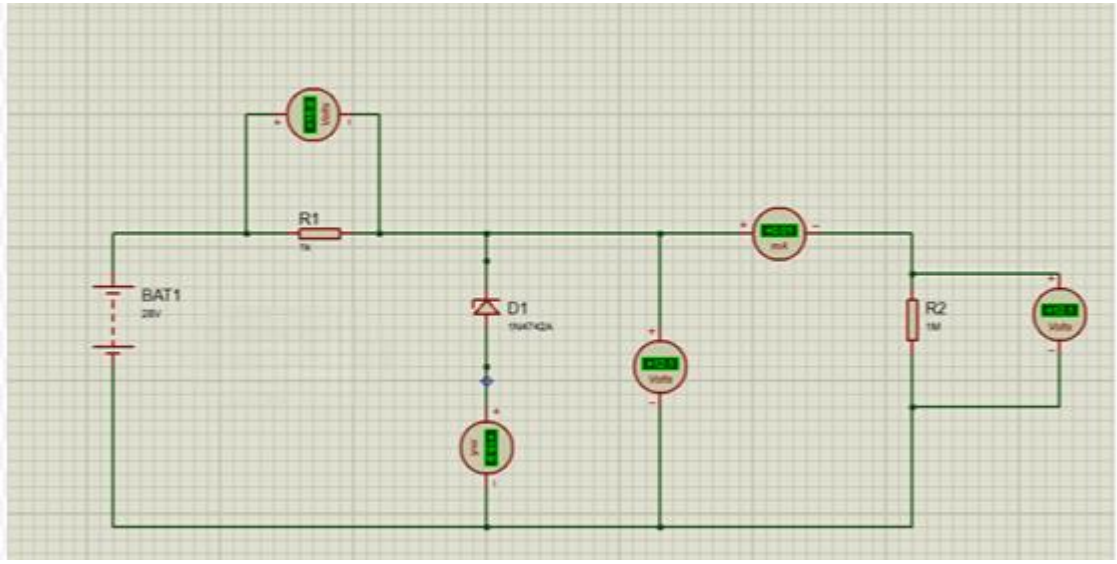
Schematic circuit:

- Set the DC supply to 0 V and record the measured value of R. Fig. 1
- Set the DC supply (E) to the values appearing in Table 4.1 and measure both VZ and VR.

Result:

Ev	7V	9V	12V	50V	120V
Vs	0	0	0.08	37.9	108
Vz	7.00	9	11.9	12.1	12.1
Iz	0	0	0.08	37.9	108

- Construct the circuit of Fig.
- Record the measured value of each resistor.
- Measure the value of VL and VR. Using the measured values, calculate the Value for current across R, IR, current across RL, IL, and current across the Zener Diode.



Result:

Threshold value of Rl:

RL=RsVZ\Vin-Vz

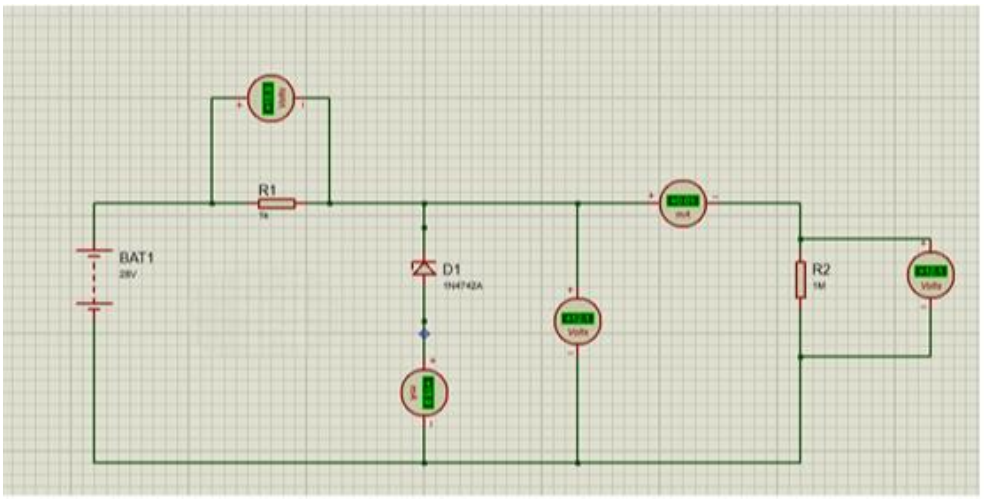
Using values:

RL =(1000)(12)/(28-12)

RL =12000/16

RL =750

Verification:



Optimal value of RL:

RL=(Vin-Vz)/Vz

Using values:

=1000(28-16)/12

=1000(16)/12

=1333 ohm

Verification: