

# Experiment 13

**Zener Diode**

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**Enrolment no. : E21CSEU0001**

## Aim:

To study Zener diode as a voltage regulator

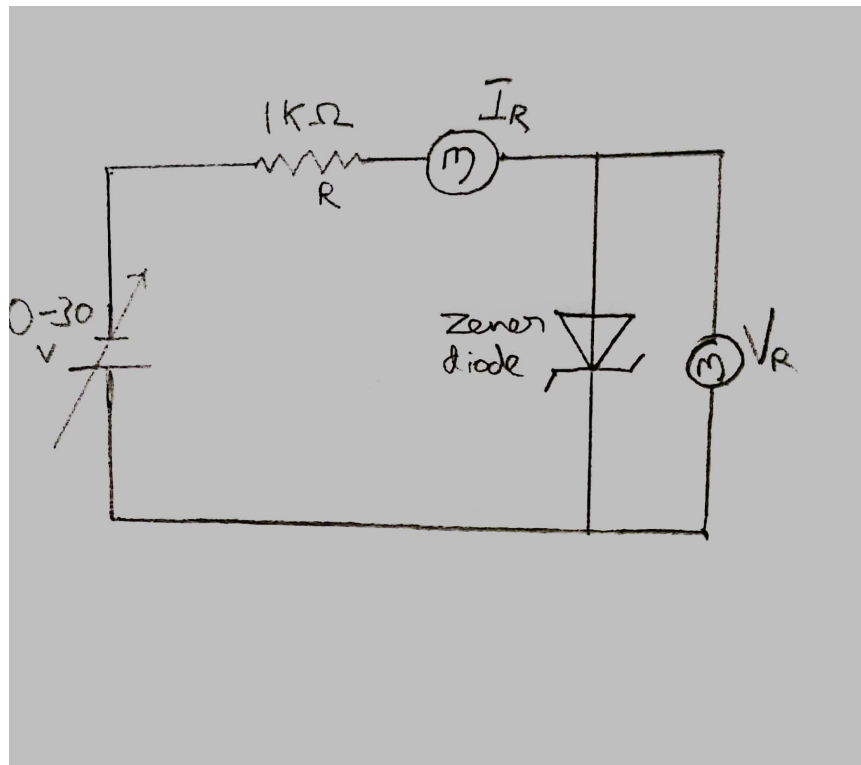
## Apparatus Required:

Zener diode, multimeter, breadboard, power supply, connecting wires.

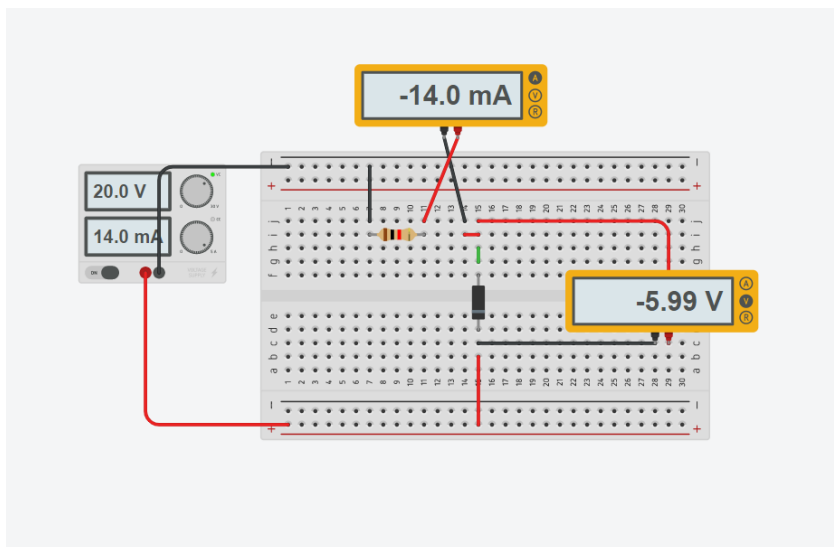
## Theory:

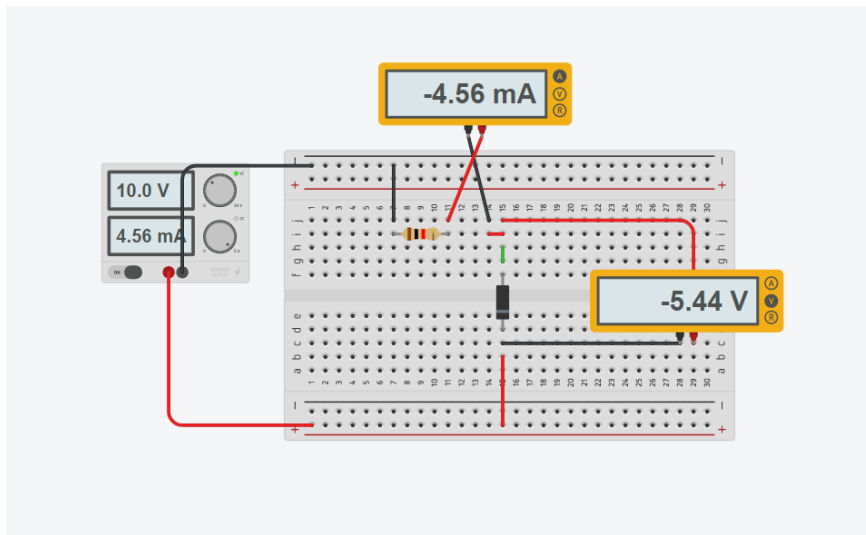
Zener diode is a P-N junction diode specially designed to operate in the reverse-biased mode. It is acting as a normal diode while forward biasing. It has a particular voltage known as break down voltage, at which the diode break down while reverse biased. In the case of normal diodes, the diode damages the breakdown 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, its depletion region will be narrow. When a high reverse voltage is applied across the junction, there will be a very strong electric field at the junction. And the electron-hole pair generation takes place. Thus, heavy current flows. This is known as Zener breakdown. 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. This principle is used in voltage regulator using Zener diodes. The figure shows the Zener voltage regulator, it consists of a current limiting resistor  $R_S$  connected in series with the input voltage  $V_S$  and the Zener diode is connected in parallel with the load  $R_L$  in reverse biased condition. The output voltage is always selected with a breakdown voltage  $V_Z$  of the diode.

### Circuit Diagram:



### Circuit Screenshot:



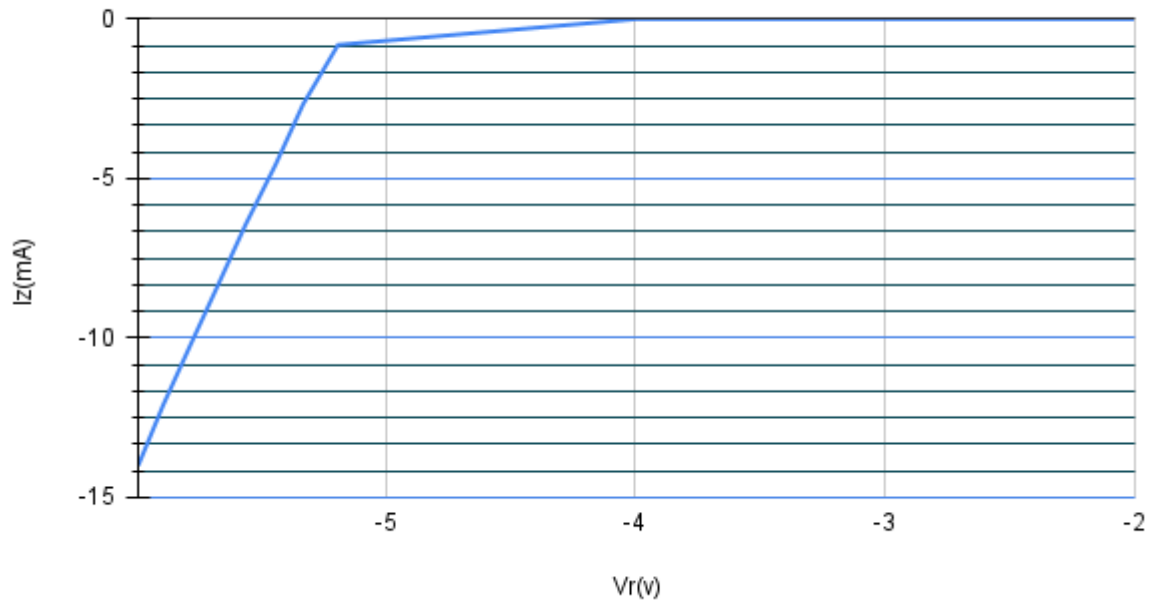


### Readings:

S no.	Source(v)	Vr(v)	Iz(mA)
1	2	-2	0
2	4	-4	0
3	6	-5.19	-0.807
4	8	-5.33	-2.67
5	10	-5.44	-4.56
6	12	-5.56	-6.44
7	14	-5.67	-8.33
8	16	-5.78	-10.2
9	18	-5.89	-12.1
10	20	-5.99	-14

**Graph:**

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**Result:**

The experiment has been verified successfully.