



EXPERIMENT

AIM: Test the performance of the Zener diode.

APPARATUS: Circuit board, D.C. power supply, zener diode, $1\text{K}\Omega$ resistor, connecting wires, D.M.M.

THEORY:

An ideal P-N Junction diode does not conduct in reverse biased condition. A zener diode conducts excellently even in reverse biased condition. These diodes operate at a precise value of voltage called break down voltage. A zener diode when forward biased behaves like an ordinary P-N junction diode. A zener diode when reverse biased can either undergo avalanche break down or zener break down.

Avalanche break down: If both p-side and n-side of the diode are lightly doped, depletion region at the junction widens. Application of a very large electric field at the junction may rupture covalent bonding between electrons. Such rupture leads to the generation of a large number of charge carriers resulting in avalanche multiplication.

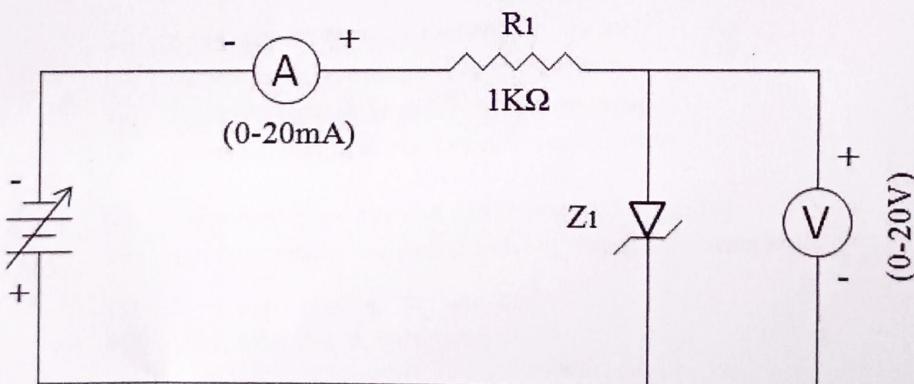
Zener break down: If both p-side and n-side of the diode are heavily doped, depletion region at the junction reduces. Application of even a small voltage at the junction ruptures covalent bonding and generates large number of charge carriers. Such sudden increase in the number of charge carriers results in zener mechanism.

Dynamic resistance of zener diode is defined as the ratio of small change in the reverse voltage to the corresponding change in reverse current. It is denoted by R_d .

$$R_d = \frac{\Delta V_Z}{\Delta I_Z}$$

Since, change in current is more compared to the change in voltage; the dynamic resistance is less.

CIRCUIT DIAGRAM:





PROCEDURE:

1. From the data sheet note down the important specifications of the diode used.
2. Connect the circuit as shown in the circuit diagram.
3. Keep the output control knob of the regulated power supply at the minimum position and switch on the supply.
4. Increase the input voltage from zero to maximum permissible value in step and at every time measure the current I_Z through the zener diode, input D.C. voltage V_I and voltage V_Z across diode.

OBSERVATION TABLE:

Sr. No.	VOLTAGE	CURRENT
1		
2		
3		
4		
5		
6		

CONCLUSION: