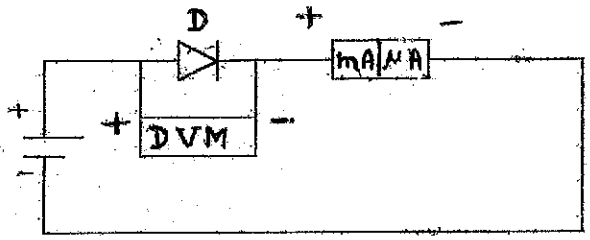
p – n JUNCTION DIODE & ZENER DIODE

(i) p – n Junction Diode Experiment

(a) Forward – Bias: Assemble the circuit digram of p-n junction diode as Given in diagram –I(a).



PS: Power Supply.
DVM: Digital Voltmeter.
MA/μA: Milliammeter/microammeter
D: Diode.

Fig – (a)

PS: Power supply, DVM: Digital Voltmeter mA/μA; Milliameter/micrometer D: Diode.

Put the power supply switch in the range O-10-Volt. Put the ammeter switch in milliammeter range as the current in the forward bias in a p-n junction diode of the order of milliamter. By varying the power supply voltage record the the DVM reading and thecorrespanding ammeter reading. Plot the I-V curve for the p-n junction diode on a graph paper.

(b) Reverse – Bias: Assemble the reverse –bias circuit digrame of the p-n junction diode as given in digram – (i) (b)

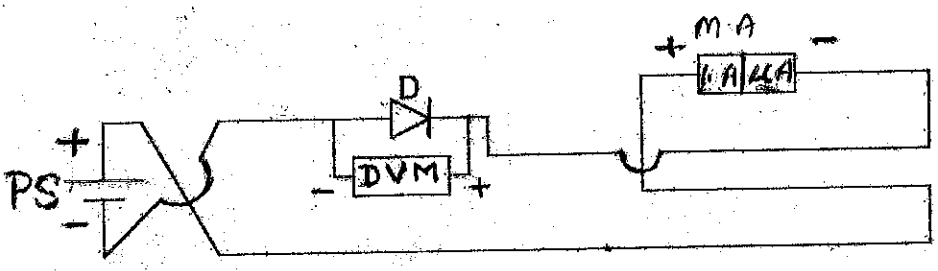
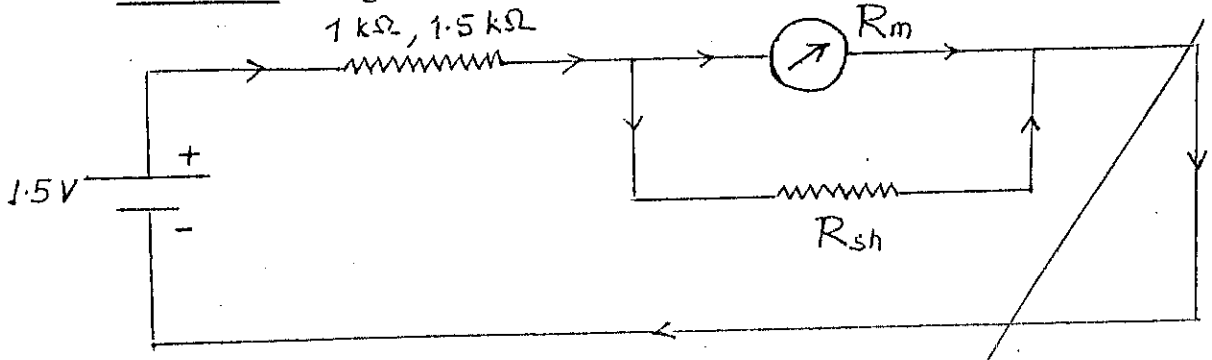


Fig. – 1 (b)

Put the PS switch in 0-10 Volt. range and the ammeter in the microampere Range. By varying the power supply voltage record the DVM reading the corespending μA reading and plot the I-V curve on a graph paper.

Verification : for given resistances, say, 1kΩ and 1.5kΩ



FIG

(a) for 1kΩ :-

$I = 1.5V / (1 \times 10^{+3}\Omega) = 1.5mA$ (Calc.) ---------- div.

------- (Obs.) ---------- div.

(b) for 1.5kΩ :-

$I = 1.5V / (1.5 \times 10^{+3}\Omega) = 1.0mA$ (Calc.) ---------- div.

---------- (Obs.) ---------- div.

(c) 0 – 20mA Range

Again using equation (2), we have,

$R_{sh} = 5.7\Omega$ for this range.

Verification : for a given set of resistances, say, 100Ω, 502.3Ω and 1000Ω.

(i) for 100Ω

$I = 1.5V / (1 \times 10^{2}\Omega) = 15mA$ (Calc.) ---------- div.

---------- (Obs.) ---------- div.

(ii) for 502.3Ω

$I = 1.5V / (5.023 \times 10^{2}\Omega) = 2.99mA$ (Calc.) ---------- div.

---------- (Obs.) ---------- div.

(iii) for 1000Ω

$I = 1.5V / (1 \times 10^{3}\Omega) = 1.5mA$ (Calc.) ---------- div.

---------- (Obs.) ---------- div.

The forward and reverse – bias characteristic curves should be plaotted On the same graph paper for comparision.

(ii) Zener Diode Experiment:

The Zener diode is a p-n junction diode and is used electronic/electrical circuits in in reverse – bias mode. Therefore, assemble the circuits for the zener diode similar to the reverse-bias case of the p-n junction diode. This circuit diagram is given in Fig. (ii).

Put the PS in the range 0-10 Volt and the ammeter in the milliampere range. Now by varying the PS voltage record the reading of the DVM and mA. Initially the current through the zener diode is very small which may be recorded by keeping the ammeter in the μA range (if one desires). When break down occurs the current increases very rapidly (ideally the resistance at the break down voltage is exceeding small-near to zero).

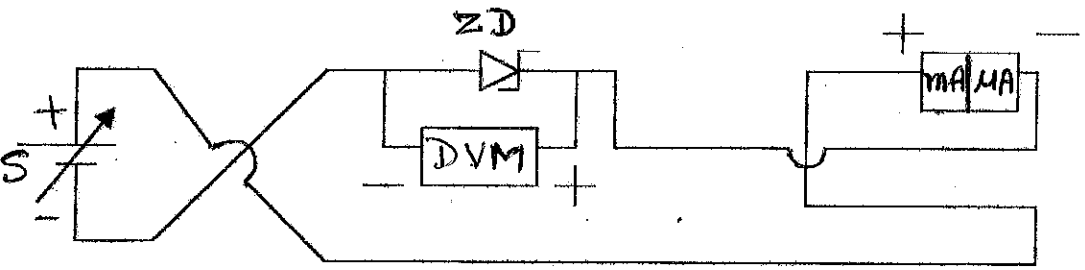


Fig. ii

Same relevant Questions

(1) In what respect a p-n junction diode differs from a zener diode?

(2) How does the break down take place in a p-n junction diode? What is the zener break down? Is there some other type of break down?

(2) What are uses of p-n junction and zener diode.