Experiment ⇒ ①

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object ⇒ To determine the Band Gap energy in a semi conductor using a pn junction diode.

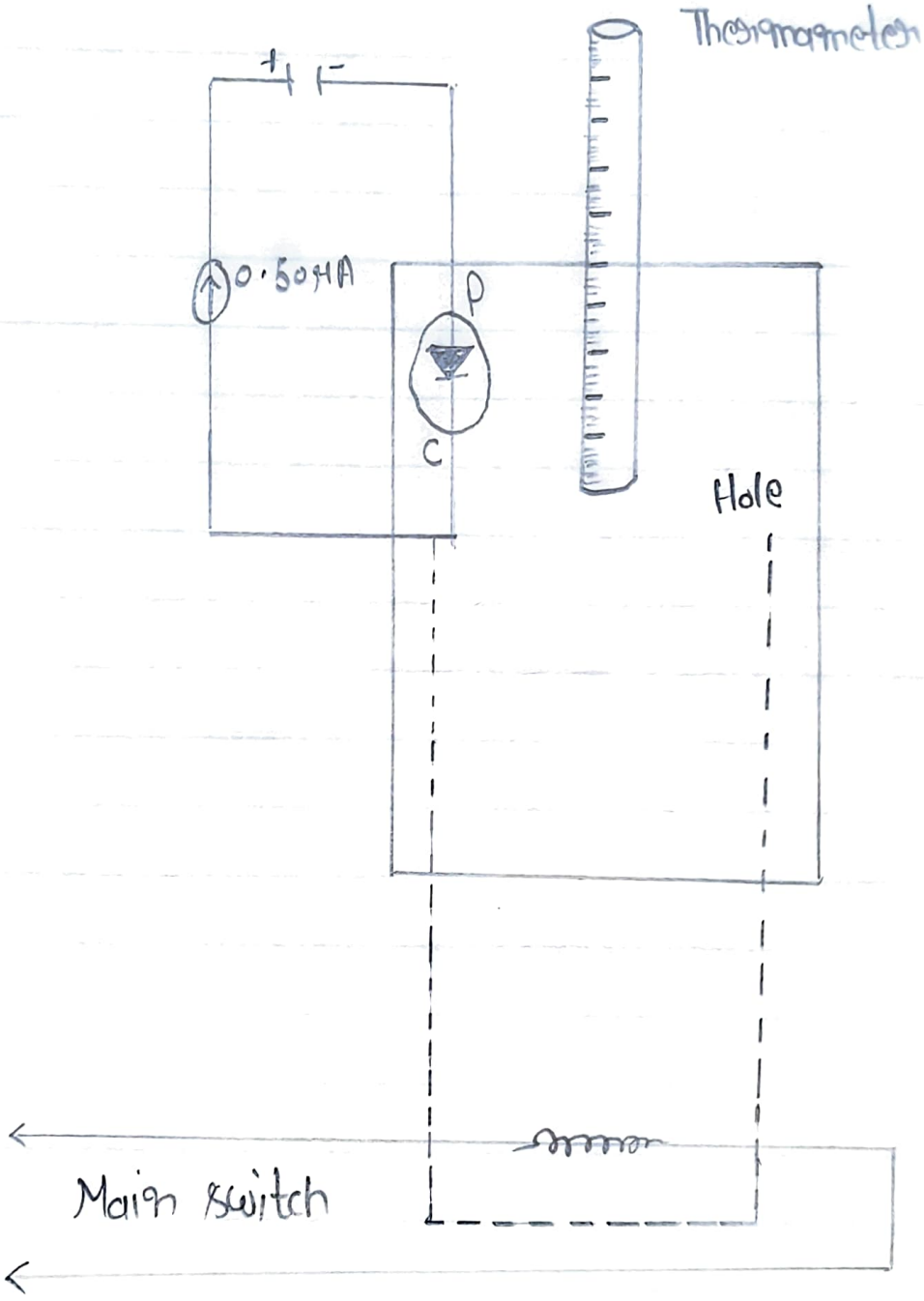
Apparatus used ⇒ power supply, Micro-ameter, electricity, thermometer, semiconductor diode.

Formula used ⇒ If Graph is plotted $10^3/T$ on x-axix and $\log_{10} I_s$ on y axix. If comes out to be a straight line cutting both x and y axix. So Band Gap ΔE in ev is given by -

$$\Delta E = \frac{\text{slope Value of line}}{5.036}$$

Where - I_s is reverse saturation current and T temp in K it, s slope is found ΔE is Band Gap.

observation ⇒ least Count of micro-Meter = 2μA
least Count Voltmeter = 2V



oven to heat the diode.

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S.No.	Current in MA (I_s)	Temp.	t + 273 t°c 349	$10^3/T$	$\log_{10} I_s$
1	28	76	347	2.865	1.4472
2	26	74	345	2.882	1.4150
3	24	72	343	2.898	1.3802
4	22	70	339	2.915	1.3484
5	20	68	337	2.945	1.3010
6	18	64	335	2.967	1.2553
7	16	62	335	2.985	1.2041
8	14	58	331	3.021	1.1461

Graph ⇒ Graph is plotted b/n $10^3/T$ on x-axix and $\log_{10} I_s$ on y-axix, It comes out to a straight line cutting the x-axix and y axix.

Calculation ⇒ From the graph.

$AC = 1.3484 - 1.1461 = 0.1963$

$BC = 3.021 - 2.0151 = 0.106$

Slope at the line $= \frac{AC}{BC} = \frac{0.1963}{0.106} = 1.85$

Now $\Delta E = \frac{\text{Slope of the line}}{5.036} = \frac{1.85}{5.036}$

$\boxed{\Delta E = 0.36 \text{ eV}}$

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Result ⇒ Band Gap for the Given semiconductor

$$\Delta E = 0.36 \text{ eV}$$

precautions ⇒ (i) the maximum Temp. should not exceed 80°C

(2) Bulb of the thermometer and diode should be presented well in the oven.