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UID – 20BCS2761
SEMESTER – 2ND
SUBJECT – QUANTUM AND SEMECONDUCTOR LAB MST WORKSHEET
DOF – 25/03/2021

AIM OF THE EXPERIMENT – To determine the resistivity ofthe semiconductor by four probe method.

APPARATUS –

S. NO.	EQUIPMENT	RANGE	QUANTITY
1.	Four probe Arrangement	NA	1
2.	OVEN	0-200 C	1
3.	Constant current generator	0-200mA	1
4.	Digital panel meter	NA	1
5.	Oven power supply	12 V	1

OBSERVATIONS –

(i) Distance between the probes (s) = 0.2 cm
(ii) Thickness of the crystal chip (W) = 0.05cm
(iii) Current (I) = 5mV (Constant)

From standard table f(w/S) = 5.89

Obs. No.	Temperature in C	Temperature in K	Voltage V in (mV)	Resistivity in (ohm-cm)
1.	30	303	141.1	6.0177
2.	35	308	137.0	5.8428
3.	40	313	133.2	5.6807
4.	45	318	129.6	5.5272
5.	50	323	126.2	5.3822

CALCULATIONS-

$P_0 = \frac{P_0}{f\left(\frac{w}{s}\right)}$ $\quad P_0 = \frac{V}{I} \times 1.256$

$f\left(\frac{w}{s}\right) = 5.89$

$P_0 = \frac{141.1}{5} \times 1.256 = 35.444$

$P_1 = \frac{P_0}{f\left(\frac{w}{s}\right)} = \frac{35.444}{5.89} = \boxed{6.0177}$

$P_0 = \frac{137.0}{5} \times 1.256 = 34.414$

$P_1 = \frac{P_0}{f\left(\frac{w}{s}\right)} = \frac{34.414}{5.89} = \boxed{5.8428}$

$P_0 = \frac{133.2}{5} \times 1.256 = 33.459$

$P_1 = \frac{P_0}{f\left(\frac{w}{s}\right)} = \frac{33.459}{5.89} = \boxed{5.6807}$

$P_0 = \frac{129.6}{5} \times 1.256 = 32.555$

$P_1 = \frac{P_0}{f\left(\frac{w}{s}\right)} = \frac{32.555}{5.89} = \boxed{5.5272}$

5. $P_0 = \frac{126.2}{5} \times 1.256 = 31.7014$

$P_1 = \frac{P_0}{f\left(\frac{w}{s}\right)} = \frac{31.7014}{5.89} = \boxed{5.3822}$

[1]

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[1]

RESULT AND DISCUSSION :-

The resistivity of the given semiconductor by four probe method of different temperature is 6.0177, 5.8428, 5.6807, 5.5272, 5.3822 ohm- centimeter.

The experiment was concluded that resistivity of semiconductors depends upon the temperature of the material.

SOURCES OF ERRORS:-

1. The resistivity of the material should be uniform in the area of measurement.
2. The surface on which the probes rest should be flat with no surface leakage.
3. The diameter of the contact between the metallic probes and the semiconductor crystal chip should be small compared to the distance between probes.

CONCLUSION:-

The experiment was concluded and proven that the band gap energy between the conduction band and the valance band.

EVALUATION COLUMN (To be filled by concerned faculty only)

Sr. No.	Parameters	Maximum Marks	Marks Obtained
1.	Worksheet completion including writing learning objectives/Outcomes. (To be submitted at the end of the day)	10	
2.	Post Lab Quiz Result.	5	
3.	Student Engagement in Simulation/Demonstration/Performance and Controls/Pre-Lab Questions.	5	
4.	Total Marks	20	
5.	Teacher's Signature (with date)		