NAME: MAJJIGA JASWANTH
REGNO: 20BCD7171

Experiment-7
(Set-I)

Title: Hall effect

Objective:
To determine the hall effect coefficient of the given Semiconductor crystal (G_c)

Tabular form:
Thickness of Sample, $t = 0.5mm$, V_{HD}

Table-1:-

$t = 0.5mm$, $V_{HD} = 125mV$, $I = 5mA$

Magnetizing Current (A)	Hall Voltage		Magnetic field (B)	R_H
	V_{HB}	$V_H = V_{HB} - V_{HD}$		
1.00	99	-26	2.77×10^{-4}	-93.86
1.75	79	-46	4.93×10^{-4}	-93.30
2.50	61.2	-63.8	7.09×10^{-4}	-89.98
3.25	48	-77	8.99×10^{-4}	-85.65
4.00	34	-91	1026×10^{-9}	-88.69

Mean Value = 90.296

Table-2:-

Applied magnetic field, $B = 2.77 \times 10^{-4}$ Tesla

input Current to Sample (mA)	Hall voltage		R_H
	V_{HB}	$V_H = V_{HB} - V_{HD}$	
5	93.8	-31.2	-112.63
4	81.1	-43.9	-198.10
3	72.0	-53	-318.89
2	63.0	-62	-559.56
1	51.0	-74	-1135.74

mean Value of $R_H = -\frac{(112.63 + 198.10 + 318.89 + 559.56 + 1135.74)}{5}$

$= -504.98$

Calculations:-

Table-1:-

w.k.T

$V_H = V_{HB} = V_{HD}$

$$R_H = \frac{t \times V_H}{I \times B}$$

finding the value of V_H in Table :-

① $V_H = V_{HB} - V_{HD}$

$= 99 - 125$

$= -26mV$

② $V_H = 79 - 125$

$= -46mV$

③ $61.2 - 125 = -63.8mV$

④ $48 - 125 = 77mV$

⑤ $34 - 125 = -91mV$

finding the value of R_H:-

① $$R_H = \frac{0.5 \times 10^3 \times (-26)}{5 \times 10^{-3} \times 277 \times 10^{-4}}$$

$= -90.25$

② $$R_H = \frac{-0.5 \times 46}{5 \times 493 \times 10^{-4}}$$

$= 93.30$

③ $$R_H = \frac{-0.5 \times 63.8}{3 \times 709 \times 10^{-4}}$$

$= -89.98$

④ $$R_H = \frac{0.5 \times 91}{5 \times 8026 \times 10^{-4}}$$

$= -88.69$

⑤ $$R_H = \frac{-0.5 \times 77}{5 \times 899 \times 10^{-14}}$$

$= -85.65$

$t = 0.5mm$

$V_{HD} = 125mV$

$I = 5mA$

[SET-2]

Table-1 $t = 0.5mm$, $V_{HD} = 191.3mA$, $I = 5mA$

magnetising Current	Hall Voltage		magnetic field	R_H
	V_{HB}	$V_H = V_{HB} - V_{HD}$		
1.00	128.1	-63.2	80×10^{-4}	-790
1.75	89.7	-101.6	144×10^{-4}	-750.55
2.00	47.4	-143.9	211×10^{-4}	-681.99
3.25	21.8	-169.5	260×10^{-4}	-651.92
4.0	2.8	-188.5	298×10^{-4}	-632.5

Mean value of $R_H = -\frac{(790 + 750.55 + 681.99 + 651.92 + 632.5)}{5}$

$= -692.402$

Table-2 Applied magnetic field $= 80 \times 10^{-4} T$

Input Current to the Supply	Hall voltage		RH
	V_{HB}	$V_H = V_{HB} - V_{HD}$	
5	135.0	-56.3	-703.75
4	91.0	-100.3	-1567.18
3	65.0	-126.3	-2631.25
2	29.0	-162.3	-5071.89

Mean value of $R_H = -\frac{(703.75 + 1567.18 + 2631.25 + 5071.89)}{4}$

$= -2493.51$

Calculations:

① $128.1 - 191.3 = -63.2$

② $89.7 - 191.3 = -101.6$

③ $47.4 - 191.3 = -143.4$

④ 21·8 - 191·3 = -169·5

⑤ 2·8 - 191·3 = -188·5

① $R_H = \frac{0.5 \times (-63.2)}{5 \times 80 \times 10^{-6}}$

$R_H = -790$

② $R_H = \frac{0.5 \times (-101.6)}{5 \times 144 \times 10^{-4}}$

$R_H = -70.5$

③ $R_H = \frac{0.5 \times (-143.9)}{5 \times 211 \times 10^{-4}}$

$R_H = -681.99$

④ $R_H = \frac{0.5 \times (-169.5)}{5 \times 260 \times 10^{-4}}$

$R_H = -651.92$

Table: 2

① 135·0 - 191·3 = -56·3

② 91·0 - 191·3 = -100·3

③ 65·0 - 191·3 = -126·3

} V_H

④ 29·0 - 191·3 = -162·3

① $R_H = \frac{0.5 \times (-56.3)}{5 \times 80 \times 10^{-4}}$

$= -703.75$

② $R_H = \frac{0.5 \times (-126.3)}{3 \times 80 \times 10^{-4}}$

$= -2631.25$

③ $R_H = \frac{0.5 \times (-100.3)}{4 \times 80 \times 10^{-4}}$

$= -1567.18$

④ $R_H = \frac{0.5 \times (-162.3)}{2 \times 80 \times 10^{-4}}$

$= -5071.87$

Results:

1) The hall coefficient of the given Semi-Conductor was found to be

a) when current is constant: 90.296

b) when magnetic field is constant: 504.9

2) The hall coefficient of the given Semi-Conductor was found to be:

a) when current is constant: 692.602

b) when magnetic field is constant: 2493.51