LAB EXPERIMENT-5

Title of the experiment :- Band gap of a Thermistor

Objective :- To determine the energy gap (E_g) of a Thermistor

formula :- $E_g = \frac{2.606 \times K \times m}{1.6 \times 10^{-19}}$ ev

where E_g = energy gap of a given thermistor in ev

K = Boltzmann constant = 1.381×10^{-23} J/K

m = Slope of the graph

Tabular Column :-

S.NO	Temparatu (K)	Temp(K^{-1}) 1/T	Voltage 2V			Voltage 4V		
			I(mA)	R(Ω)	log R	I(MA)	R(Ω)	log R
1	303	3.3×10^{-3}	0.1	20	1.30	0.3	13.3	1.123
2	313	3.2×10^{-3}	0.2	10	1	0.4	10	1
3	323	3.1×10^{-3}	0.3	6.6	0.81	0.6	6.6	0.81
4	333	3.0×10^{-3}	0.4	5	0.69	1.0	4	0.60
5	343	2.9×10^{-3}	0.6	3.3	0.51	1.7	2.35	0.37
6	353	2.8×10^{-3}	1.0	2	0.30	2.8	1.42	0.15
7	363	2.7×10^{-3}	1.5	1.3	0.11	4.5	0.8	-0.09
8	373	2.6×10^{-3}	2.2	0.9	-0.04	6.6	0.60	-0.22

Calculations, :

Now, Calculation of Slope

for 2 Volt $= \frac{4.3 - 2.9}{3.3 \times 10^{-3} - 2.6 \times 10^{-3}}$

$= \frac{1.4}{7 \times 10^{-4}} = 2000$

for 4 volt $= \frac{(4.1 - 2.7)}{(3.3 \times 10^{-3} - 2.6 \times 10^{-3})}$

$= \frac{1.4}{0.7 \times 10^{-3}}$

$= 2000$

for 2 volts,

$Eg = \frac{4.606 \times k \times m}{1.6 \times 10^{-19}}$ eV

$= \frac{4.606 \times 1.381 \times 10^{-23} \times 2000}{1.6 \times 10^{-19}}$ eV

$= 0.795$ eV

for 4 volts,

$Eg = \frac{4.606 \times 1.381 \times 10^{-23} \times 2000}{1.6 \times 10^{-19}}$ eV

$= 0.795$ eV

Result :-

The energy gap (band gap) of the given thermistor is 0.795 eV

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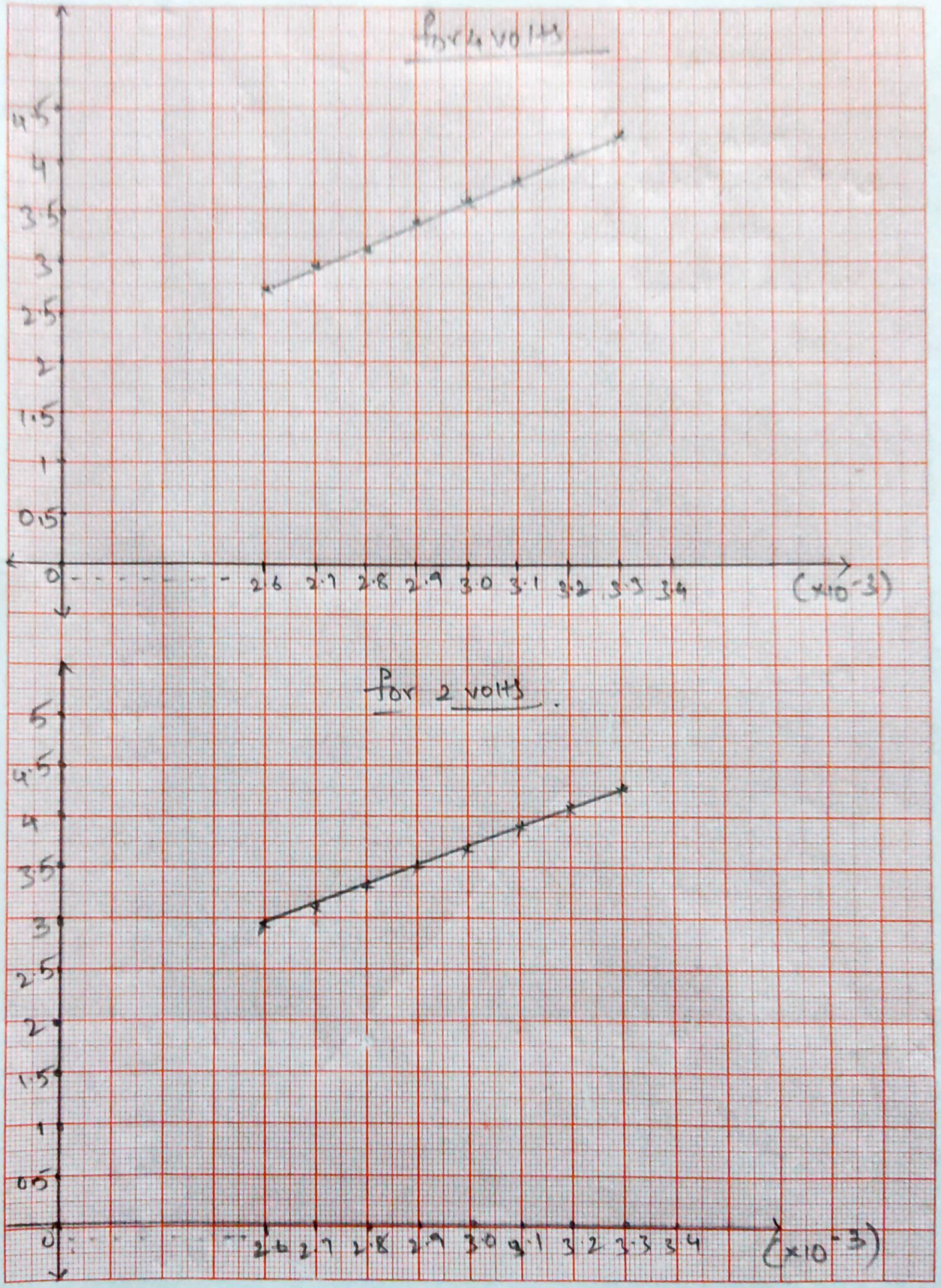

log R →

log R →

→ Temperature