Date: 19/08/2022

Roll No: 21951A6754 Name: P. JYOTHI PRASANNA

Exp No: 12 Experiment Name: PLANK'S CONSTANT

DAY TO DAY EVALUATION:

	Preparation	Algorithm	Source Code	Program Execution	Viva	Total
		Performance in the Lab	Calculations and Graphs	Results and Error Analysis		
Max. Marks	4	4	4	4	4	20
Obtained	4	4	4	4	4	20

Signature of Lab I/C

START WRITING FROM HERE:

AIM: Determination of Planks constant.

APPARATUS:
1) Variable voltage source
2) Current meter
3) Temperature controlled oven.
4) LED's

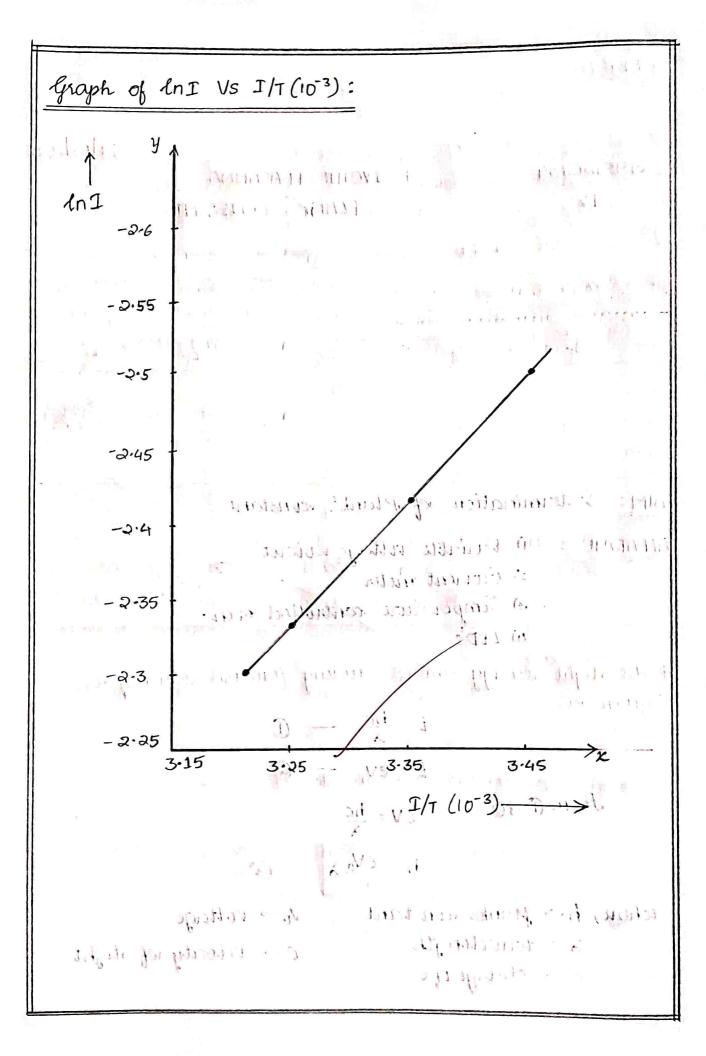*The light energy emitted during forward biasing is given as,

$$E = \frac{hc}{\lambda} \quad — \quad ①$$

$$E = eV \quad — \quad ②$$

From ① & ②

$$eV = \frac{hc}{\lambda}$$

$$\boxed{h = \frac{eV_0}{c}\lambda} \quad — \quad ③$$

where, $h \rightarrow$ planks constant. $V_0 \rightarrow$ voltage
$\lambda \rightarrow$ wavelength
$e \rightarrow$ charge of $\bar{e}$ $c \rightarrow$ velocity of light.

Graph of $\ln I$ Vs $I/T \, (10^{-3})$:

FORMULA:

$$V_0 = V - \left\{ \frac{\Delta \ln I}{\Delta T} \times \frac{K}{e} \times \eta \right\}$$

V = voltage across LED

K = Boltzman constant

e = charge of e^-

η = material constant.

$\dfrac{\Delta \ln I}{\Delta T}$ = Slope

$$\boxed{h = \frac{e V_0}{c} \lambda}$$

OBSERVATION TABLE:

S.No	TEMPERATURE $T\,^\circ C$	TEMPERATURE $T\,K$	CURRENT I (mA)	$\frac{1}{T} \times (10^3)\, K^{-1}$	$\ln I$
1	32	305	2.71	3.28	0.94
2	39	312	2.98	3.21	1.09
3	45	318	3.23	3.14	1.17
4	51	324	3.47	3.09	1.24
5	57	330	3.72	3.03	1.31
6	63	336	3.98	2.98	1.38

RESULT:

Plank's constant $\boxed{h = 6.676 \times 10^{-34} \text{ Joule-sec}}$

VIVA VOCE :

1. What is LED.

   Light-Emitting-Diode, in electronics, a semiconductor device that emits infraded or visible light when charged with an electric current.

2. What are direct bandgap semiconductors.

   A (DBG) semiconductor is one in which the maximum energy level of valence band aligns with the minimum energy level of the conduction band with respect to momentum.

3. What is the value of h?

   $h = 6.6260715 \times 10^{-34} J \cdot s$

4. Explain forward biasing?

   Forward bias or biasing is where the external voltage is delivered across the P-N junction diode. In a forward bias setup, the P-side of the diode is attached to the positive terminal & N-side is fixed to the negative side of the battery. The applied voltage is opposite to the junction barrier potential.

5. What are the units of Planks constant?

   Planks constant is the product of energy multiplied by time.

   SI unit of Planks constant $= 6.62607015 \times 10^{-34} J/s$