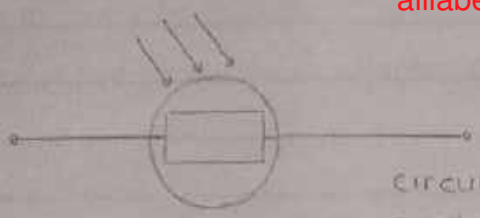
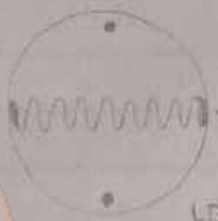
Aim: To study the variation of resistance in an LDR (a) with variation of light intensity and (b) with variation of height of light source.



circuit diagram symbol of LDR



CdS (cadmium sulphide track)

LDR

milliammeter

voltmeter

Observations:

Voltmeter:

Range of voltmeter = 0-10V

Least count of voltmeter used = 0.1V

Milliammeter:

Range of milliammeter = 0-200 mA (Digital)

Least count of milliammeter = 0.1mA

Voltage from power supply: 5V

Reading in voltmeter: 5V

Aim: To study the variation of ~~intensi~~ resistance in an LDR (a) with variation of light intensity and (b) with variation of height of light source.

Apparatus: Luxometer, Ruler, Breadboard, LDR, Lamp.

Theory:

An LDR is a component that has a variable resistance that changes with the light intensity that falls upon it. The common type of LDR has a resistance that falls with an increase in the light intensity falling upon the device.

A light dependent resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the material's conductivity is increased when light is absorbed by the material.

When photons falls on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. When light having energy greater than the band gap of the material strikes on the device, more and more electrons are excited to the conduction band which results in a large number of carriers. More current starts flowing & hence the resistance of the device decreases.

When an LDR is kept in the dark, its resistance is very high. This resistance is called dark resistance.

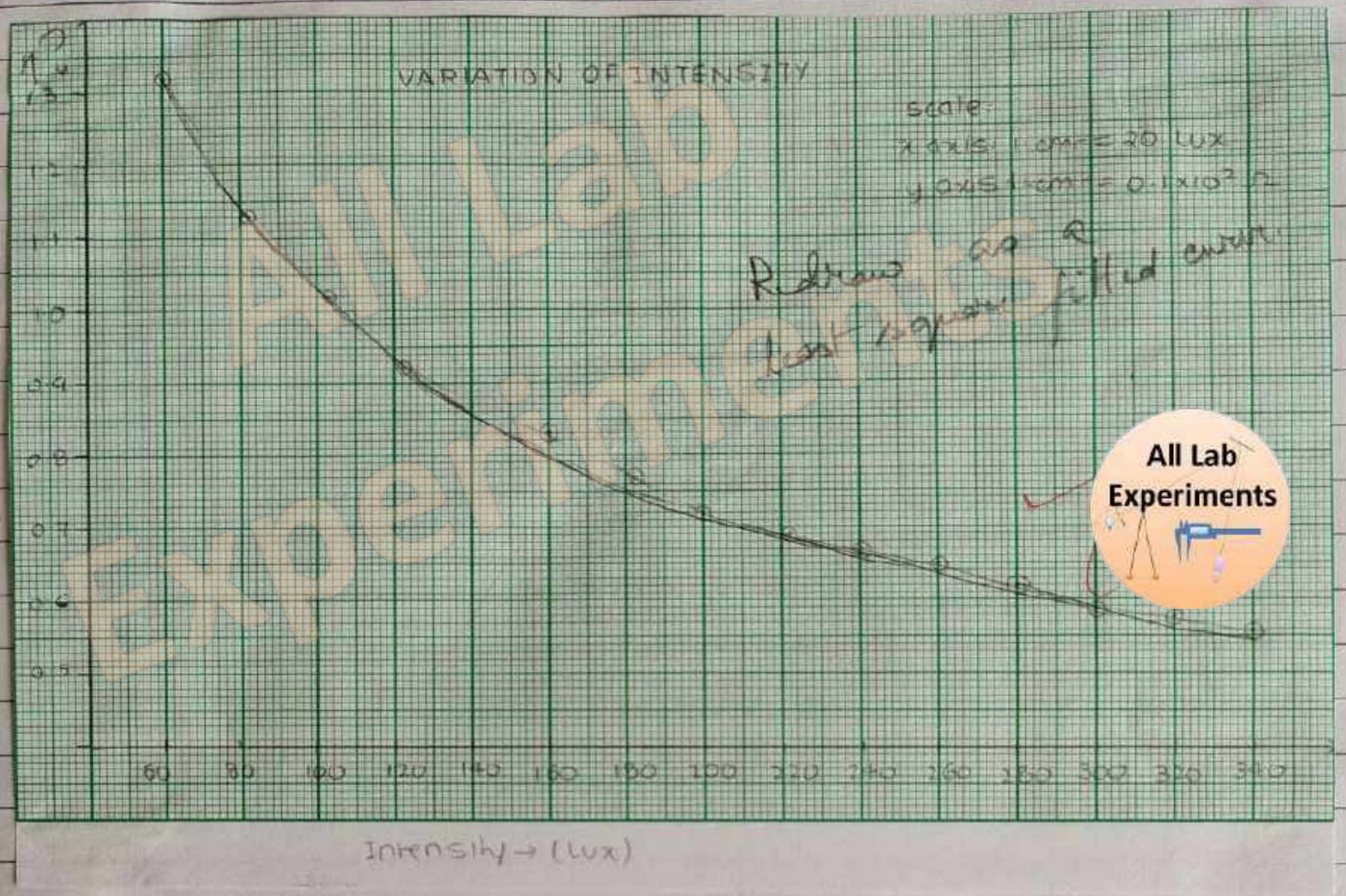
Observations:

1. In the dark room:
   Intensity 0
   Resistance 0·3968 kΩ
   Current in mA: 12·6

2. In Ambient light:
   Intensity: 6 Lux
   Resistance: 0·3311 kΩ
   Current in mA: ?

Case (1): Variation of intensity

S. No	Intensity (Lux)	Current (mA)	Resistance (kΩ)	Resistance (10^2 Ω)
1	60	37·2	0·134	1·34
2	82	43·2	0·116	1·16
3	103	48·2	0·104	1·04
4	122	53	0·094	0·94
5	141	56·7	0·088	0·88
6	160	60·4	0·083	0·83
7	182	64·6	0·077	0·77
8	200	67·5	0·074	0·74
9	222	71·5	0·069	0·69
10	240	74·2	0·067	0·67
11	260	77·4	0·065	0·65
12	280	80·4	0·062	0·62
13	300	83·4	0·059	0·59
14	320	86·2	0·058	0·58
15	340	86·86	0·056	0·56

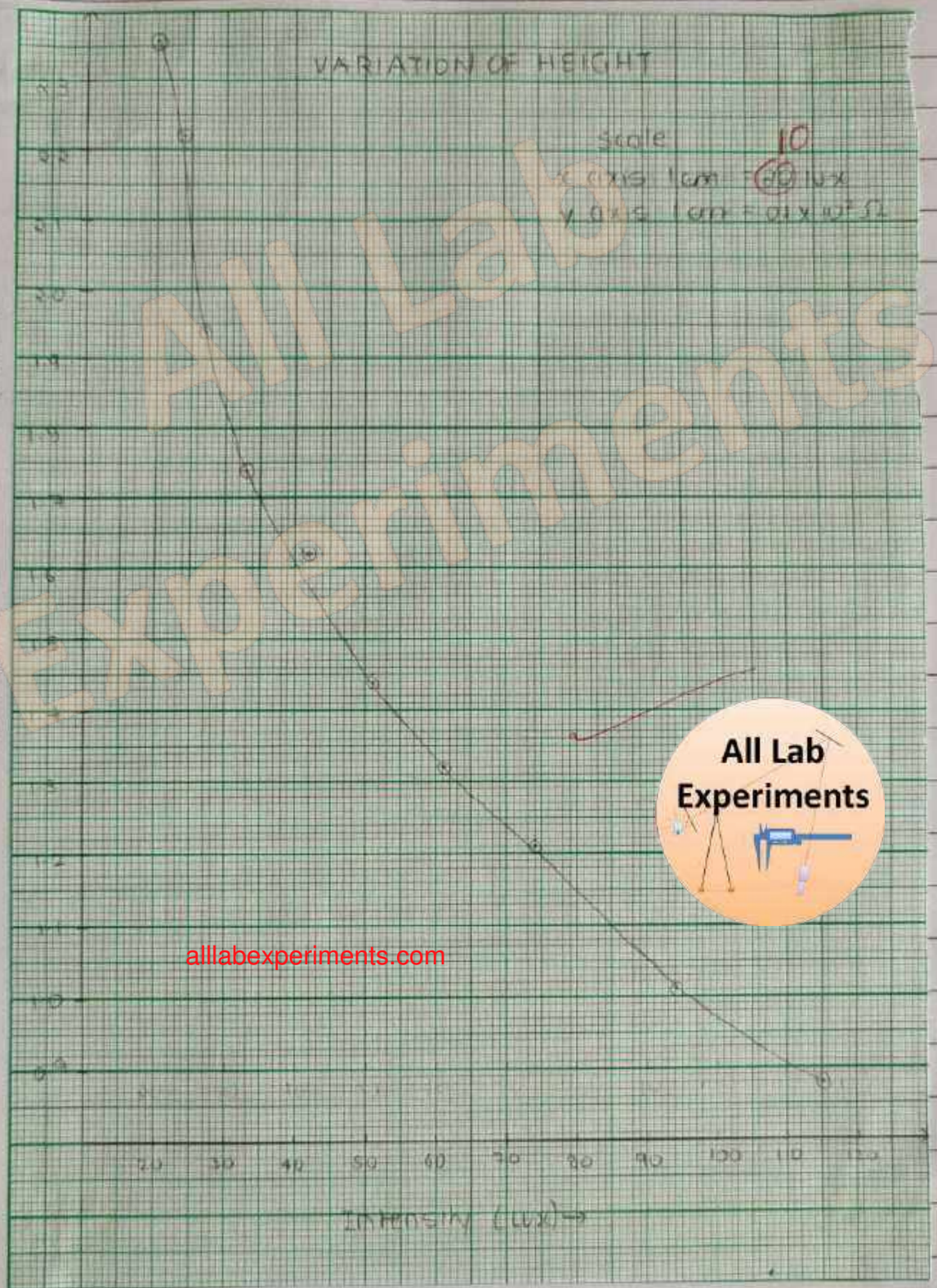


Precautions and Sources of Error:

1. The source of light and the ambient light in the room must not have varying intensity with time.
2. The luxometer and the LDR must be at the same height from the light source.
3. The dark resistance must be taken in a completely dark room.

case (ii) Variation of height of lamp:

S.No	Height of lamp w.r.t ground (cm)	Intensity (Lux)	Current (mA)	Resistance (kΩ)	Resistance ($10^2\Omega$)
1.	5	115	56.5	0.088	0.88
2.	10	94	49.3	0.101	1.01
3.	15	74	41.2	0.121	1.21
4.	20	61	38	0.132	1.32
5.	25	51	34.7	0.144	1.44
6.	30	42	30.9	0.162	1.62
7.	35	33	28.7	0.174	1.74
8.	40	27	25.8	0.194	1.94
9	45	24	22.5	0.222	2.22
10.	50	20	21.2	0.236	2.36



Result: ~~Resistance - Intensity curves were plotted in both cases and it was found that Resistance varies with both intensity and height.~~ The resistance of the LDR decreases as the intensity of the incident light increases.

Teacher's Signature _____