

Our Lady of Pillar Convent School, Jodhpur



Physics Lab Manual Readings & Practical File Writing Instructions

X - Science

Total Experiments in Physics to be written in Practical File = 07

2 | X Physics (Science) Lab Manual Readings

Format of Writing Physics Experiments in the File:

LHS (Blank side: Pencil Work)	RHS (Ruled Side: Pen Work)
Experiment Number	Date
Circuit Diagram/Ray Diagram	Experiment Number
Observation	Aim
Calculation	Apparatus
Result	Theory (In short i.e. 2 to3 lines)
	Procedure
	Precautions (2 points)
	Sources of error (2 points)

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- 1) **Aim:** To study the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance (R). Also plot a graph between V and I.

Observation:

Range of ammeter = 0-3 A
 Least count of ammeter = 0.1 A
 Zero error of ammeter = 0 A
 Range of voltmeter = 0-3 V
 Least count of voltmeter = 0.1 V
 Zero error of voltmeter = 0 V

S.No.	Reading of voltmeter V (volt)		Reading of ammeter I (ampere)		Resistance R = V/I (Ω)
	Observed	Corrected	Observed	Corrected	
1	0.5	0.5	0.5	0.5	1
2	1	1	1	1	1
3	1.5	1.5	1.5	1.5	1
4	2	2	2	2	1

Calculation:

- a) $R = V/I = 0.5/0.5 = 1 \Omega$
 b) $R_{\text{mean}} = (R_1+R_2+R_3+R_4)/4 = (1+1+1+1)/4 = 1 \Omega$

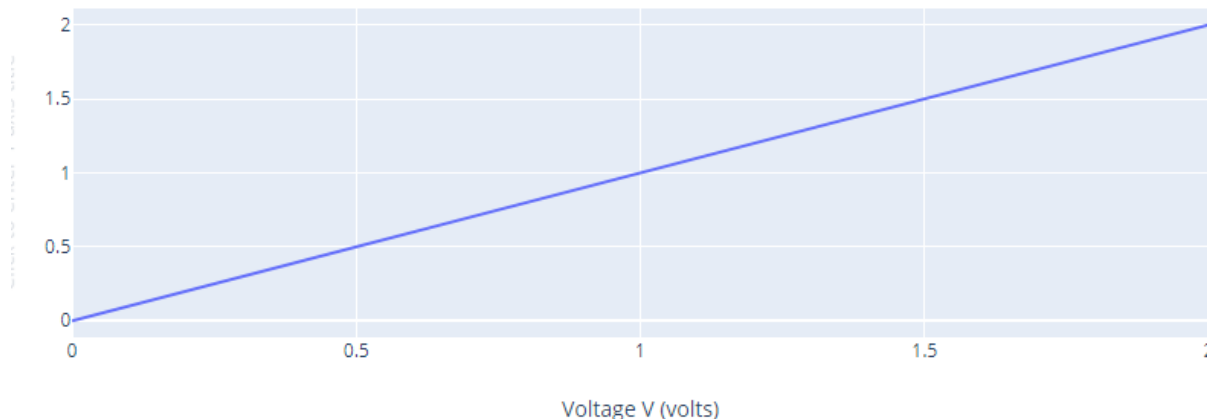
Graph: (Note: Take a full page A4 size graph paper and plot the following graph and stick the graph paper in the practical file)

Scale:

X axis: 2 cm = 0.5 V

Y axis: 2 cm = 0.5 A

Current I (A)



- 2) **Aim:** To determine the equivalent resistance of two resistors, when connected in series combination.

Observation:

Range of ammeter = 0-3 A

Least count of ammeter = 0.1 A

Zero error of ammeter = 0 A

Range of voltmeter = 0-3 V

Least count of voltmeter = 0.1 V

Zero error of voltmeter = 0 V

Resistor used	Observations	Voltmeter reading (volt)	Ammeter reading (ampere)	$R = V/I$ (Ω)	Mean value of resistance (Ω)
R_1	(a)	0.2	0.2	1	1
	(b)	0.4	0.4	1	
	(c)	0.6	0.6	1	
R_2	(a)	0.2	0.2	1	1
	(b)	0.4	0.4	1	
	(c)	0.6	0.6	1	
$R_s = R_1 + R_2$	(a)	0.2	0.1	2	2
	(b)	0.4	0.2	2	
	(c)	0.6	0.3	2	

Calculations:

a) Mean value of $R_1 = 1 \Omega$

b) Mean value of $R_2 = 1 \Omega$

c) Equivalent value of series combination:

- By calculation, $R_s = R_1 + R_2 = 1 + 1 = 2 \Omega$
- By experiment, $R_s' = 2 \Omega$
- Difference in both values, $R_s - R_s' = 2 - 2 = 0 \Omega$

- 3) **Aim:** To determine the equivalent resistance of two resistors, when connected in parallel combination.

Observation:

Range of ammeter = 0-3 A

Least count of ammeter = 0.1 A

Zero error of ammeter = 0 A

Range of voltmeter = 0-3 V

Least count of voltmeter = 0.1 V

Zero error of voltmeter = 0 V

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Resistor used	Observations	Voltmeter reading (volt)	Ammeter reading (ampere)	R = V/I (Ω)	Mean value of resistance (Ω)
R ₁	(a)	0.2	0.2	1	1
	(b)	0.4	0.4	1	
	(c)	0.6	0.6	1	
R ₂	(a)	0.2	0.2	1	1
	(b)	0.4	0.4	1	
	(c)	0.6	0.6	1	
$R_p = \frac{R_1 R_2}{R_1 + R_2}$	(a)	0.2	0.4	0.5	0.5
	(b)	0.4	0.8	0.5	
	(c)	0.6	1.2	0.5	

Calculations:

- a) Mean value of R₁ = 1 Ω
- b) Mean value of R₂ = 1 Ω
- c) Equivalent value of parallel combination:
 - By calculation, $R_p = \frac{R_1 R_2}{R_1 + R_2} = 0.5 \Omega$
 - By experiment, $R_p' = 0.5 \Omega$
 - Difference in both values, $R_p - R_p' = 0.5 - 0.5 = 0 \Omega$

- 4) **Aim:** To determine the focal length of concave mirror by obtaining the image of distant object.

Observations:

Name of the distant object	Distance between the concave mirror and the screen		Mean focal length of concave mirror
	In (cm)	In (m)	In (m)
Tree	-18.8	-0.188	-0.191
Building	-19.1	-0.191	
Tower	-19.5	-0.195	

Calculation:

- a) Focal length for first object $f_1 = -0.188 \text{ m}$
- b) Focal length for second object $f_2 = -0.191 \text{ m}$
- c) Focal length for third object $f_3 = -0.195 \text{ m}$
- d) Mean focal length = $-(f_1 + f_2 + f_3)/3 = -(0.188 + 0.191 + 0.195)/3 = -0.191 \text{ m}$

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- 5) **Aim:** To trace the path of a ray of light passing through a rectangular glass slab for different angles of incidence. Measure the angle of incidence, angle of refraction, angle of emergence and interpret the result.

Observation:

S.No.	Angle of incidence i	Angle of refraction r	Angle of emergence e
1	30°	20°	29°
2	45°	28°	42°
3	60°	35°	57°

Calculation:

- a) Angle of deviation, $\delta_1 = i_1 - e_1 = 30^\circ - 29^\circ = 1^\circ$
b) Angle of deviation, $\delta_2 = i_2 - e_2 = 45^\circ - 42^\circ = 3^\circ$
c) Angle of deviation, $\delta_3 = i_3 - e_3 = 60^\circ - 57^\circ = 3^\circ$

- 6) **Aim:** To trace the path of the rays of light through a glass prism.

Observation:

S.No.	Angle of incidence i	Angle of deviation δ
1	35°	54°
2	45°	47°
3	55°	52°
4	65°	65°

Calculation:

- a) Mean value of angle of incidence,
$$i = (i_1 + i_2 + i_3 + i_4) / 4 = (35^\circ + 45^\circ + 55^\circ + 65^\circ) / 4 = 50^\circ$$
- b) Mean value of angle of deviation,
$$\delta = (\delta_1 + \delta_2 + \delta_3 + \delta_4) / 4 = (54^\circ + 47^\circ + 52^\circ + 65^\circ) / 4 = 54.5^\circ$$

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7) **Aim:** To find the image distance for varying object distances in case of a convex lens.

Observation:

- Approximate focal length of thin convex lens, $f = 15$ cm
- Height of candle flame/object needle, $h = 5$ cm

Position of optical centre of lens	Position of candle/object needle	Position of screen of other side of lens	Distance between lens and candle	Distance between lens and screen	Height of image	Magnification
L (cm)	O (cm)	S (cm)	$u = -(L-O)$ (cm)	$v = S-L$ (cm)	h' (cm)	h'/h
50	25	89	-25	39	-8	-1.6
50	10	77	-40	27	-3.2	-0.64