Physics Practical Examination

General instructions:

- Duration of practical examination: 2 hours.
- Maximum marks allotted: 30 marks.

Scheme of valuation

A. Weightage of marks

Sl. No.	Particulars	Marks
1	Performing the Experiment	20
2	Viva - voce	04
3	Practical Record	06
	Total	30

B. Distribution of marks for Performing the Experiment

Sl. No.	Particulars	Marks
1	Writing the principle of the experiment	2
2	Writing the formula and explaining the terms	2
3	Writing the diagram/figure/circuit with labeling (At least two parts)	2
4	Writing the tabular column/ observation pattern	2
5	Constructing the experimental setup / circuit	3
6	Performing the experiment and entering the readings into the tabular column / observation pattern	4
7	Substitution and calculation / plotting the graph	3
8	Result with unit	2

C. Viva – voce

1. Four questions must be asked and each question carries 1 mark.
2. The questions in the viva- voce should be simple, direct and related to the experiment to be performed by the student.

RESISTANCE PER UNIT LENGTH OF THE WIRE

Principle: Ohm's law – The electric current flowing through a conductor is directly proportional to the potential difference across the ends of the conductor when temperature and other physical conditions remain constant.

Formula: 1) Resistance of the wire, R = $\frac{1}{m}$

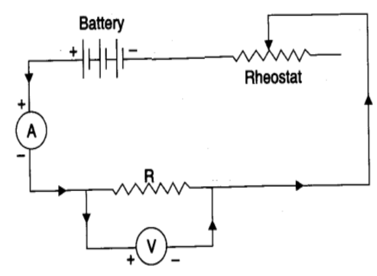
Where R – resistance of wire,

m = slope of the graph of potential difference versus current.

2) Resistance per unit length = $\frac{R}{L}$

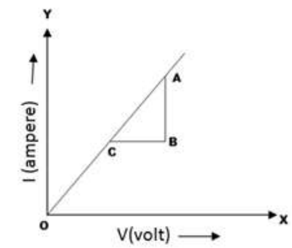
Where L – the length of experimental wire.

Diagram:



V- Voltmeter
A- Ammeter
R- Resistance wire

Graph:



Observation:

Length of the wire, L = …………….m

Tabular column:

Trail No.	I in Ampere	V in Volt

Result: Resistance per unit length of the given wire = ………………… Ωm^{-1}

RESISTIVITY OF THE MATERIAL OF THE WIRE

Principle: Ohm's law – The electric current flowing through a conductor is directly proportional to the potential difference across the ends of the conductor when temperature and other physical conditions remain constant.

Formula: 1) Resistance of the wire, $\mathbf{R} = \frac{V}{I}$

Where V – Potential difference across the wire

I – Current through the wire.

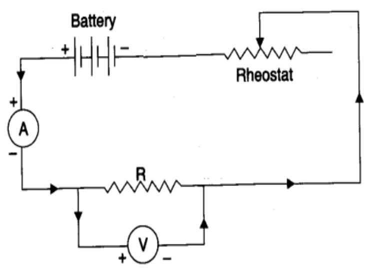
2) Resistivity of the material of the wire, $\rho = \frac{\pi r^2 R}{L}$

Where R – Resistance of the wire

L – Length of the experimental wire.

r – radius of the wire.

Diagram:



V- Voltmeter
A- Ammeter
R- Resistance wire

Observations:

1. Radius of the experimental wire (given), r = ...m
2. The length of the experimental wire, L = ...m

Tabular column:

Trail No.	I in ampere	V in volt	R= $\frac{V}{I}$ in Ω	Mean R in Ω
1				
2				
3				

Result: Resistivity of the material of the wire, ρ = ...Ωm

FIGURE OF MERIT OF GALVANOMETER

Principle: Deflection in a galvanometer is directly proportional to the current through the galvanometer. I = K θ

Formula: $K = \frac{E}{(R+G)\theta}$

Where K = Figure of merit of galvanometer,

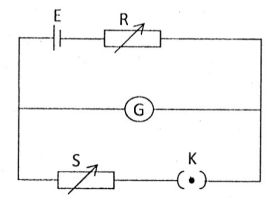
E = emf of the cell,

R = Resistance in series with the galvanometer,

G = Galvanometer resistance,

θ = Deflection in the galvanometer.

Diagram:



E - Cell
K – Key
G – Galvanometer
R & S – Resistance boxes

Observations:

Emf of the battery, E = ...V

Tabular column:

Trail No.	Resistance R in Ω	Deflection θ in div	S for $\frac{\theta}{2}$ in Ω	G = $\frac{RS}{R-S}$ in Ω	K= $\frac{E}{(R+G)\theta}$ in A/div
1					
2					
3					

Result: The resistance of the galvanometer = ...Ω

The figure of merit of the galvanometer = ...A/div

VOLTMETER

Principle: Galvanometer can be converted in to voltmeter by connecting suitable high resistance In series with it, so that very small current flows through galvanometer.

Formula: 1) Current required for full scale deflection, $I_g = NK$

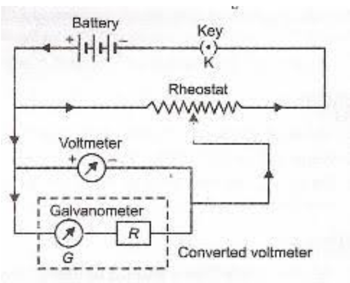
Where N – Number of divisions on either side of zero of galvanometer.
K – figure of merit of galvanometer.

2) High resistance to be connected in series with the galvanometer,

$$R = \frac{V}{I_g} - G$$

Where G – Galvanometer resistance
V – Maximum voltage to be measured.

Diagram:



Observation:

1. Resistance of the galvanometer, G (given) = ……………………..Ω.
2. Figure of merit of the galvanometer, K (given) = ………………………A/div.
3. Number of divisions on either side of the galvanometer scale, N = ………………………..div
4. Current required for producing full scale deflection of N divisions, I_g = NK = ………………A
5. Maximum voltage to be measured, V (say 3V) = ……………………..V

Result:

The value if the calculated series resistance, **R** = …………………………….Ω

The value of the observed series resistance, **R'** = …………………………….Ω

FREQUENCY OF AC

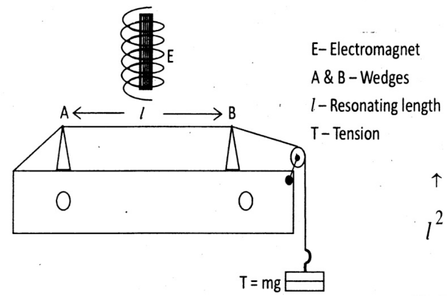
Principle: At resonance, the frequency of alternating current is equal to half of the frequency of vibration of the stretched string.

Formula: Frequency of alternating current,

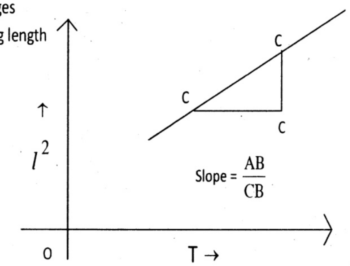
$$f = \frac{1}{4\sqrt{m(slope)}}$$

Where m = mass per unit length of the string,
Slope = Slope of the graph of l^2 versus T

Diagram:



Graph:



Observations:

1) Mass per unit length of the wire, m (given) = …………………..kgm^{-1}
2) Acceleration due to gravity, g = 9.8 ms^{-2}

Tabular column:

Trail No.	Mass attached to the string (M) in kg	Tension T = Mg in N	Resonating length l in m	l^2 in m^2
1				
2				
3				

Result: The frequency of alternating current = …………………… Hz.

FOCAL LENGTH OF CONCAVE MIRROR

Principle: 1) The object distance must be greater than the focal length of the concave mirror o get real and inverted image.

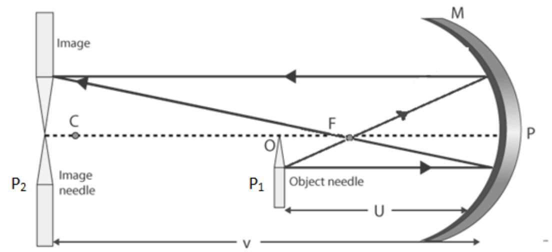
2) Focal length is the distance between the pole and principal focus of the concave mirror.

Formula: $f = \frac{uv}{u+v}$

Where u = distance of illuminated object from the mirror and

v = distance of half screen from the mirror.

Diagram:



P_1 – object pin
P_2 – Image pin

Observations:

Tabular column:

Trail No.	Object distance u in cm	Image distance v in cm	$f = \frac{uv}{u+v}$ in cm	$Mean$ f in cm
1				
2				
3				

Result: The focal length of the concave mirror is = …………………… cm.

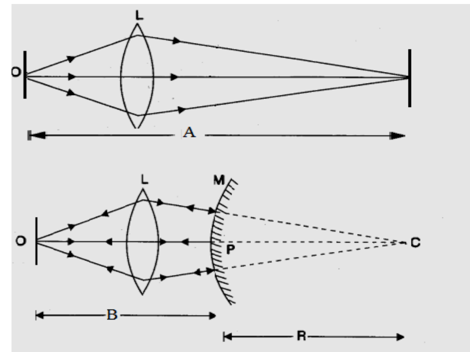
FOCAL LENGTH OF CONVEX MIRROR

Principle: Focal length is the distance between the pole and principal focus of the convex mirror.

Formula: f = $\frac{R}{2}$

Where R = Radius of curvature of the convex mirror.

Diagram:



L – Convex lens
M – Convex mirror
R – Radius of curvature
C – Center of curvature
P – Pole of the mirror

Observations:

Tabular column:

Trail No.	Position C of imagein cm	Position M of the convex mirror in cm	Radius of curvature R=(C-M) in cm	Focal length f=R/2 in cm	Mean f in cm
1					
2					
3					

Result: The focal length of the convex mirror is = …………………… cm

FOCAL LENGTH OF CONVEX LENS

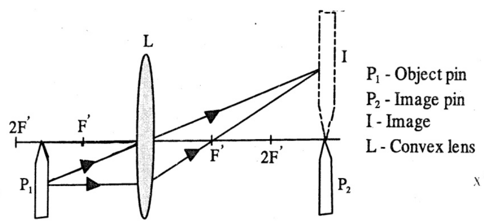
Principle: 1) The object distance must be greater than focal length of the convex lens to get real and inverted image.

2) When object distance is equal to twice the focal length of the convex lens, then the image distance will equal to twice the focal length.

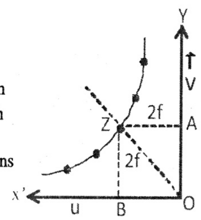
Formula: Focal length of convex lens $f = \frac{OA+OB}{4}$

Where OA – image distance and OB – object distance.

Diagram:



Graph:



Observations:

Tabular column:

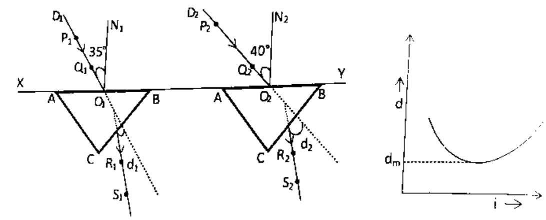
Trail No.	Object distance u in cm	Image distance v in cm
1		
2		
3		
4		
5		

Result: The focal length of the convex lens = …………………… cm

ANGLE OF MINIMUM DEVIATION

Principle: The angle of deviation is the angle between angle of incidence and angle of emergent ray. At minimum deviation, the light ray passes through the prism symmetrically. Hence angle of incidence = angle of emergence.

Diagram:



Observations:

Trail no.	Angle of minimum deviation (i) in degree	Angle of deviation (d) in degree
1		
2		
3		
4		
5		

Result: The angle of minimum deviation, **dm** = …………………

REFRACTIVE INDEX OF GLASS

Principle: The refractive index of the glass with respect to air is the ratio of real thickness of the glass slab to its apparent thickness.

Formula: Refractive index of the glass with respect to air, $n_g = \frac{R_3 - R_1}{R_3 - R_2}$

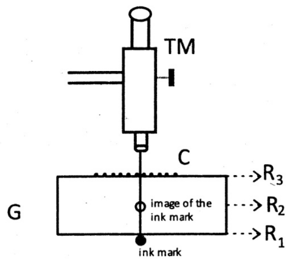
Where R_1 = Reading of the microscope when focused on the ink mark through air.

R_2 = Reading of the microscope when focused on the ink mark through glass slab.

R_3 = Reading of the microscope when focused on the chalk dust on the upper surface of the glass slab.

TR = MSR + (CVD x LC), Where MSR – main scale reading,
CVD – coincide vernier reading,
LC – least count.

Diagram:



TM – Travelling microscope
G – Glass slab
O – ink mark
I – Virtual image of the ink mark
C - Chalk Powder

Observations:

1. Value of one MSD, S = ……….x 10^{-2}m.
2. Number of divisions on the vernier, N = ………….
3. Least count of the microscope, LC = $\frac{S}{N}$ = …………x 10^{-2}m.

Tabular column:

Trail no.	Reading R_1 in cm	Reading R_2 in cm	Reading R_3 in cm	RI of glass $n_g = \frac{R_3 - R_1}{R_3 - R_2}$
1				
2				
3				

Result: The refractive index of glass = …………………

REFRACTIVE INDEX OF WATER

Part 1

Principle: 1) The rays of light from the object incident normally on the concave mirror, retrace their paths so that image of the object forms by the side of the object.

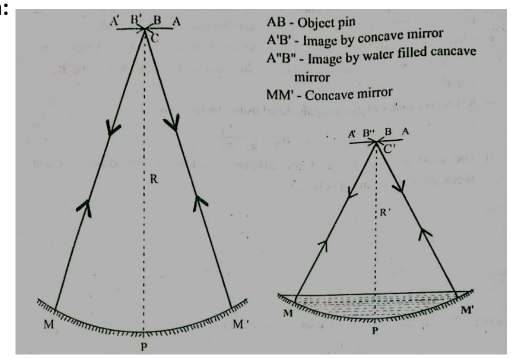
2) The bottom of the concave mirror containing water , appears to be raised up Because of refraction of light through water.

Formula: R.I of water with respect to air is n_w =R/R\`

Where R = Radius of curvature of concave mirror in air.

R\` = Radius of curvature of concave mirror in water.

Diagram:



Observations:

1. Radius of curvature of concave mirror in air is R = ……….cm.

2. Radius of curvature of concave mirror with water R\` = ……….cm.

Result: The refractive index of water = ………………

Part 2

Principle: 1) The rays of light from the object incident normally on the plane mirror, retrace their paths so that image of the object forms by the side of the object.

2) It is based on the relation between radii of curvature of equiconvex lens and Effective focal length of the glass and water lenses.

Formula: 1. Focal length of water lens, $f_w = \frac{ff'}{f-f'}$

Where f - focal length of convex lens.

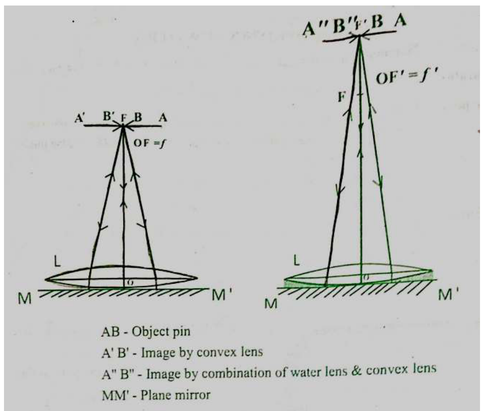
f' - focal length of combination of glass lens and water lens

2. Refractive index of water, $n_w = 1 + \frac{R}{|f_w|}$

Where R – radius of curvature of equiconvex lens

$|f_w|$ – magnitude of focal length of the lens formed by water.

Diagram:



Observations:

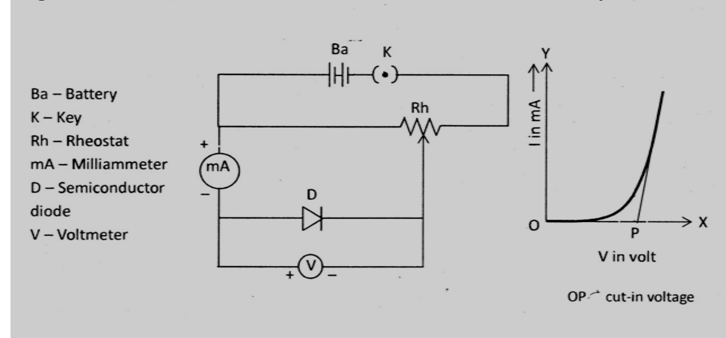
1. Radius of curvature of equiconvex lens (given) R = …………..cm.
2. Focal length of convex lens, f = …………..cm
3. Focal length of lens combination, f' = …………….cm

Result: The refractive index of water = ………………

SEMICONDUCTOR DIODE

Principle: When the diode is forward biased it conducts and offers very low resistance. Cut in voltage is the characteristic voltage at which diode current increases exponentially even for small increase in bias voltage, when diode is in forward bias.

Diagram: **Graph:**



Observation:

Voltage V in Volt									
Current I in mA									

Result: cut in voltage of the given diode = ……………………V