GVHSS PAYYOLI- PHYSICS PRACTICAL SECTION A

1. You are given a rectangular/ cylindrical body and vernier calipers .Using the Vernier calipers measure the dimension of the body, tabulate the observation and hence find the volume of given body?
   *Least count of the vernier=Value of one main scale division / no of divisions on the vernier
   *Total reading=M.S.R+(V.S.R×L.C)
   M.S.R- main scale reading,V.S.R-vernier scale reading,L.C- least count
   *Volume of cylinder,$V=\pi r^2h$, r= radius of cylinder,h= height of cylindr
   *Volume of rectangular block,V= lbh
   l= length,b= breadth,h=height
   Observations and calculations: cylinder
   Value of one main scale division=.....mm
   No of divisions on the vernier=...
   Least count= value of one m s d/ no of division on vern
   =.....mm =....cm

Dimensions	Trial no	MSR cm	VSR div	Total reading= MSR+(VSR×LC)	Mean cm
Diameter					
Length					

   Mean diameter of the cylinder=...cm=...m
   Radius of the cylinder(r)=.....m
   Mean length of the cylinder(l)=.....m
   Volume of the cylinder,$V= \pi r^2h$=...m^3
   Observations and calculations: rect bk

Dimensions	Trial no	MSR cm	VSR div	Total reading= MSR+(VSR×LC)	Mean cm
length					
Breadth					
height					

   Mean length of the block=.....m
   Mean breadth of the block=.....m
   Mean height of the block=.....m
   Volume of the rectangular block,V=lbh= ....m^3
2. A sphere of known mass is given along with vernier calipers. Determine diameter and hence volume. Also find the density of sphere (mass of sphere=.....)
   *Least count of the vernier=Value of one main scale division / no of divisions on the vernier
   *Total reading=M.S.R+(V.S.R×L.C)
   M.S.R- main scale reading,V.S.R-vernier scale reading,L.C- least count
   * volume of sphere,$V=4/3\pi r^3$,r= radius of the sphere
   * density = mass/ volume
   Observations and calculations
   Value of one main scale division=.....mm
   No of divisions on the vernier=...
   Least count= value of one m s d/ no of division on vern
   =.....mm =....cm

Dimensions	Trial no	MSR cm	VSR div	Total reading= MSR+(VSR×LC)	Mean cm
Diameter					

   Mean diameter of the sphere=....cm=....m
   Radius of the sphere=...m
   * volume of sphere,$V=4/3\pi r^3$= ....m^3
   Density of the sphere= mass/ volume=....kg/m^3
3. You are supplied with vernier calipers. Determine internal volume of the given calorimeter.Hence find mass of water that can be taken in the calorimeter(density of water is 1000 kg/m^3.)
   *Least count of the vernier=Value of one main scale division / no of divisions on the vernier
   *Total reading=M.S.R+(V.S.R×L.C)
   M.S.R- main scale reading,V.S.R-vernier scale reading,L.C- least count
   Volume of calorimeter= πr^2h, r= radius,h=depth of the calorimeter
   Mass of water=volume×density
   Observations and calculations
   Value of one main scale division=.....mm
   No of divisions on the vernier=...
   Least count= value of one m s d/ no of division on vern

dimensions	Trial no	MSR cm	VSR div	Total reading= MSR+(VSR×LC)	Mean cm
diameter					
depth					

   Diameter of calory meter= .....cm=....m
   Radius of calori meter=....m
   Depth of calory meter=....m
   Volume of calorimeter, V= πr^2h=...m^3
   Mass of water,volume×density=...kg
4. A screw gauge and a meter scale are supplied . Determine diameter of wire and hence find its volume.
   *Pitch is the distance moved for one complete rotation
   *Least ount.(LC)=pitch/ no of divisions on the head scale
   *Total reading= PSR+ (Corrected HSR×LC)
   PSR- pitch scale reading,HSR- head scale reading,LC- least count
   Volume of the wire,V= πr^2l, r – radius , l - length of the wire
   Observations and calculations
   Distance moved for five rotation=...mm
   Pitch=distance moved for five rotation/5
   Least count=pitch/ no of divisions on head scale
   Zero error...div, zero correction=.....div

Trial no	PSR mm	HSR	Corrected HSR	Total reading=PSR+(corrected HSR×LC) mm	Mean mm

   Mean diameter of the wire=.....mm=....m
   Radius of the wire=....m
   Volume of the wire= V= πr^2l=....m^3
5. Determine thickness of glass plate and its volume. You are supplied with screw gauge and graph paper.
   *Pitch is the distance moved for one complete rotation

*Least ount.(LC)=pitch/ no of divisions on the head scale

*Total reading= PSR+ (Corrected HSR×LC)

PSR- pitch scale reading,HSR- head scale reading,LC-least count

Volume of the glass plate,V= area ×thickness

Observations and calculations

Distance moved for five rotation=…mm

Pitch=distance moved for five rotation/5

Least count=pitch/ no of divisions on head scale

Zero error=…div, zero correction=…..div

Trial no	PSR mm	HSR	Corrected HSR	Total reading=PSR+(corrected HSR×LC) mm	Mean mm

Thickness of glass plate=….mm=….m

Area of glass plate=…mm^2=….m^2

Volume of glass plate=area×thickness= …m^3

6. Determine the volume of given lead shot using screw gauge?

*Pitch is the distance moved for one complete rotation

*Least ount.(LC)=pitch/ no of divisions on the head scale

*Total reading= PSR+ (Corrected HSR×LC)

PSR- pitch scale reading,HSR- head scale reading,LC-least count

Volume of lead shot,V= 4/3 πr^3, r – radius

Observations and calculations

Distance moved for five rotation=…mm

Pitch=distance moved for five rotation/5

Least count=pitch/ no of divisions on head scale

Zero error…div, zero correction=…..div

Trial no	PSR mm	HSR	Corrected HSR	Total reading=PSR+(corrected HSR×LC) mm	Mean mm

Mean diameter of the lead shot=…..mm=…m

Radius of the lead shot=….m

Volume of lead shot,V= 4/3 πr^3= ….m^3

7. Using the principle of moments determine mass of given body?

By principle of moments PC×W=QC×m

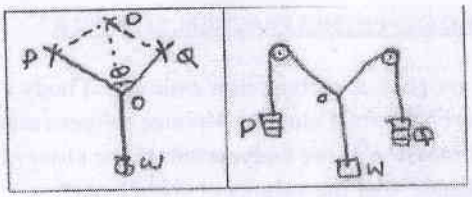
m=PC×W/QC

Observations and calculations

Trial no	W g	QC cm	PC cm	m= W×PC/QC g

Mean mass,m=….g = …kg

8. Using Graveson's Parallelogram law apparatus balance the body using three sets of known weights. Complete the parallelogram and find the mass of body



When the point o is in equilibrium resultant of P and Q balances W.By parallelo gram law if OD= diagonal then resultant,R=OD×scale

Also R=$\sqrt{P^2+Q^2+2PQ\cos\theta}$

Observations and calculations: scale 1cm=..gw

Trial no	P gwt	Q gwt	OA cm	OB cm	OD cm	Angle AOB	Calculate d value of R(gwt) ODXscale

Mean weight of the body=…gwt=.. kgwt

9. With the help of helical spring tabulate the extension for at least four different loads. Draw load extension graph and determine spring constant using the graph

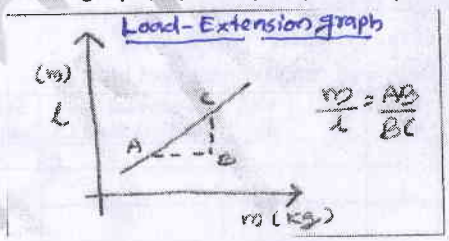
*According to Hooks law Within the elastic limit ratio of load to extension is a constant

Load/ extension= K ,spring constant

*Spring constant k=mg/l, l= extension

m- mass ,g= acceleration due to gravity

*from graph,m/l =AB/BC , k=(AB/BC)g



Observations and calculations

Trial no	Mass suspended kg	Reading of the pointer			Extension l(m)	K= mg/l N/m
		loading	unloading	Mean cm		

From graph,K= (AB/BC)×g=……N/m

10. Tabulate load extension for helical spring with atleast four different loads and find spring constant by calculation. Also find mass of given body

*According to Hooks law Within the elastic limit ratio of load to extension is a constant

Load/ extension= K ,spring constant

*Spring constant k=mg/l, l= extension

m- mass ,g= acceleration due to gravity

*mass of the body= Kl'/g, l'-extension for unknown mass

Observations and calculations: Spring const

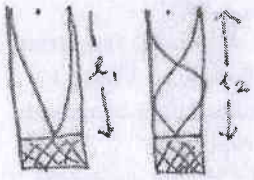
Trial no	Mass suspended kg	Reading of the pointer			Extension l(m)	K= mg/l N/m
		loading	unloading	Mean cm		

Mean ,K=……N/m

Trial no	Frequency of tuning fork,n (Hz)	First resonance length l_1 (cm)			Second resonance length l_2 (cm)			Velocity of sound $V_t = 2n(l_2 - l_1)$ cm/s²
		1	2	mean	1	2	mean	

Mean V_t=....cm/s² =.....m/s²

16. Using resonance column determine the velocity of sound at room temperature and frequency of given tuning fork. you are given the tuning fork of frequencies 512,480,426 Hz as the known values
*Velocity of sound at room temperature is $V_t = 2n(l_2 - l_1)$, n- frequency of tuning fork, l_1- first resonance length, l_2 – second resonance length



If l_1^1 and l_2^1 represents the first and second resonance length for a tuning fork of unknown frequency n^1,then $n^1 = V_t / 2(l_1^1 - l_2^1)$

Observations and calculations: (a)to find V_t

Trial no	Frequency of tuning fork,n (Hz)	First resonance length l_1 (cm)			Second resonance length l_2 (cm)			Velocity of sound $V_t = 2n(l_2 - l_1)$ cm/s²
		1	2	mean	1	2	mean	

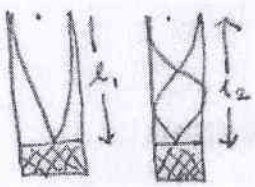
Mean V_t=....cm/s² =.....m/s²

(b)Determination of unknown frequency

Trial no	Frequency of tuning fork, (Hz) n^1	First resonance length l_1 (cm)			Second resonance length l_2 (cm)			Velocity of sound $n^1 = \frac{V_t}{2(l_1^1 - l_2^1)}$ Hz
		1	2	mean	1	2	mean	
	unknown							

Unknown frequency ,n^1=.....Hz

17. Compare the frequencies of two tuning forks using resonance column . Hence find the end correction
If l_1 and l_2 are the first and second resonance length for a tuning fork of frequency n_1,then velocity of sound at room temp is given by,$V_t = 2n_1(l_2 - l_1)$ .....(1)
If l_1^1 and l_2^1 are the first and second resonance length for a tuning fork of frequency $n_2$then velocity of sound at room temp is given by,$V_t = 2n_2(l_2^1 - l_1^1)$ .....(2)
from (1) and (2),ratio $n_1/n_2 = (l_2^1 - l_1^1)/(l_2 - l_1)$
end correction $e = (l_2 - 3l_1)/2$



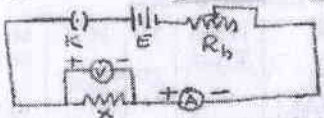
Frequency of tuning fork,n (Hz	First resonance length l_1 (cm)			Second resonance length l_2 (cm)			end correction $e=(l_2-3l_1)/2$
	1	2	mean	1	2	mean	
			l_1=			l_2=	
			l_1^1=			l_2^1=	

Ratio of frequencies,$n_1/n_2 = (l_2^1 - l_1^1)/(l_2 - l_1)$=...Hz

SECTION B

1. Determine resistance of wire by ohms law?
According to ohms law,at constant temperature the current flowing through a conductor is directly proportional to pd across its ends,ie VoltageV=IR
I-current,R-resistance , or R or X=V/I

Connection diagram



E= cell, R_h rheostat
V- voltmeter
A- Ammeter
K-Key, X- unknown res;

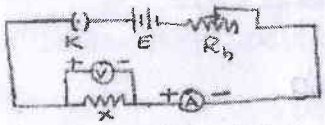
observation&calculation

Trial no	I(A)	V(v)	X=V/I (Ω)

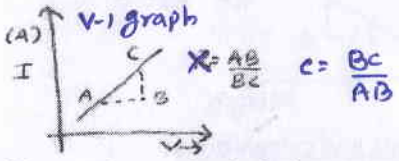
Mean ,X=.....Ω

2. By drawing current – voltage graph find resistance of given wire by ohms law and find conductance
According to ohms law,at constant temperature the current flowing through a conductor is directly proportional to pd across its ends,ie VoltageV=IR
I-current,R or X-resistance , or R or X=V/I
Conductance,C= 1/X Ω^{-1}

Connection diagram



From V-I graph X= AB/BC, conductance C= BC/AB



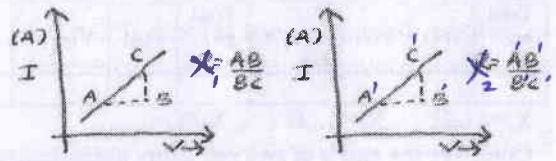
Observations and calculations

Trial no	I(A)	V(v)	X=V/I (Ω)

Mean ,X=.....Ω

from V-I graph X= AB/BC=....Ω
conductance C= BC/AB =.....Ω^{-1}

3.Using ohms law compare the resistance of two wires using V-I graph
According to ohms law,at constant temperature the current flowing through a conductor is directly proportional to pd across its ends,ie VoltageV=IR
I-current,R or X-resistance , or R or X=V/I



Observations and calculations

Trial no	resistance	I(A)	V(v)	X=V/I (Ω)
	X_1			
	X_2			

Ratio of resistance , X_1/X_2=.....

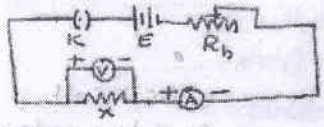
3. .Verify law of combination of resistances in series/ parallel using ohms law

According to ohms law,at constant temperature the current flowing through a conductor is directly proportional to pd across its ends,ie VoltageV=IR

*When two resistors X_1 and X_2 are connected in series effective resistance $X= X_1+X_2$

When two resistors X_1 and X_2 are connected in parallel effective resistance $X= X_1X_2 / X_1+X_2$

Connection diagram



Observations and calculations: series/parallel

Trial no	resistance	I(A)	V(v)	X=V/I (Ω)
	X_1			
	X_2			
	X_1&X_2			

Effective resistance in series(practical),X= ..... Ω

Effective resistance in series(theoretical),$X= X_1+X_2$ =... Ω

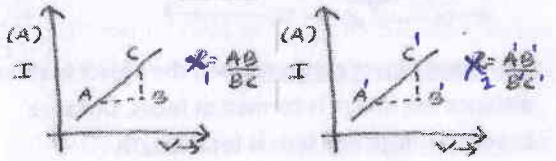
Effective resistance in parallel (practical),X= ..... Ω

resistance in parallel (theoretical)$X= X_1X_2 / X_1+X_2$...Ω

4. Verify law of combination of resistance in series / parallel using ohms law by graphical method

According to ohms law,at constant temperature the current flowing through a conductor is directly proportional to pd across its ends,ie VoltageV=IR

I-current,R or X-resistance , or R or X=V/I



When two resistors X_1 and X_2 are connected in series effective resistance $X= X_1+X_2$

When two resistors X_1 and X_2 are connected in parallel effective resistance $X= X_1X_2 / X_1+X_2$

Observations and calculations: series/parallel

Trial no	resistance	I(A)	V(v)	X=V/I (Ω)
	X_1			
	X_2			
	X_1&X_2			

Effective resistance in series(practical),X= ..... Ω

Effective resistance in series(theoretical),$X= X_1+X_2$ =... Ω

Effective resistance in parallel (practical),X= ..... Ω

resistance in parallel (theoretical)$X= X_1X_2 / X_1+X_2$...Ω

5. Determine resistivity of given wire using meter bridge and screw gauge

For a balanced condition unknown resistance is given by,X= Rl / 100-l, R- known resistance,l l- balancing length

Resistivity of the material of the wire,$P= \pi r^2X/ L$, r-radius of the wire,X-resistance,L-length of the wire

Screw gauge readings to find resistance:

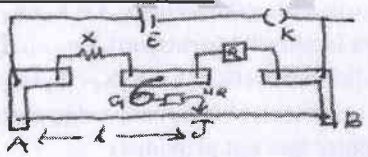
*Pitch is the distance moved for one complete rotation

*Least ount.(LC)=pitch/ no of divisions on the head scale

*Total reading= PSR+ (Corrected HSR×LC)

PSR- pitch scale reading,HSR- head scale reading,LC-least count

Connection diagram



X - unknown resistance, R- resistance
E - cell, G - galvanometer, HR- High resistance. J- Jockey

Observations and calculations:

no	Known (Ω) resistance(R)	Balancing length with unknown resistance		Mean balancing length cm	X= Rl / 100-l Ω
		In left gap(cm)	in right gap(cm)		

Distance moved for five rotation=...mm

Pitch=distance moved for five rotation/5

Least count=pitch/ no of divisions on head scale

to find radius :Zero error...div, zero correction=.....div

Trial no	PSR mm	HSR	Corrected HSR	Total reading=PSR+(corrected HSR×LC) mm	Mean mm

Mean diameter of the wire,d=....mm=....m

Mean radius of the wirer=d/2=.....m

Mean resistance,x=....Ω

Resistivity,$p= \pi r^2X/ L$=..... Ωm

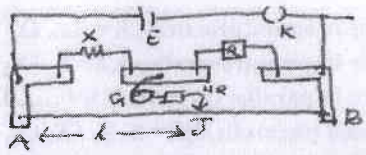
6. Verify law of combination of resistances in series/parallel using meter bridge

For a balanced condition unknown resistance is given by,X= Rl / 100-l, R- known resistance,l l- balancing length

*When two resistors X_1 and X_2 are connected in series effective resistance $X= X_1+X_2$

When two resistors X_1 and X_2 are connected in parallel effective resistance $X= X_1X_2 / X_1+X_2$

Connection diagram



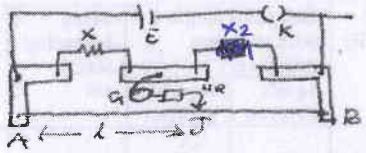
X - unknown resistance, R - resistance
E - cell, G - galvanometer, HR - High resistance, J - jockey

Observations and calculations:

no	Known (Ω) resistance(R)	Balancing length with unknown resistance		Mean balancing length cm	X= Rl 100-l
		In left gap(cm)	in right gap(cm)		
X_1					
X_2					
X_1&X_2					

Effective resistance in series(practical),X= ..... Ω
Effective resistance in series(theoretical),X= X_1+X_2 =... Ω
Effective resistance in parallel (practical),X= ..... Ω
resistance in parallel (theoretical)X= X_1X_2 / X_1+X_2...Ω

7. **Compare the resistance of two wires using meter bridge (Resistance box not provided)**
   For a balanced condition when X_1 is connected in the left gap and X_2 in the right gap.,then $X_1=X_2l$ / 100- l, where l is balancing length.then ratio of resistance,X_1/X_2= I / 100-l

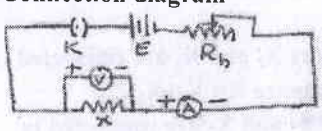


X_1 - unknown resistance, X_2 resistance
E - cell, G - galvanometer, HR - High resistance, J - jockey

No	Balancing length with unknown resistance		X_1/X_2= l / 100-l
	Left gap,X_1	Right gap,X_2	

ratio of resistance,X_1/X_2= I / 100-l =...

8. **Compare the resistance of two wires by Ohms law**
   According to ohms law,at constant temperature the current flowing through a conductor is directly proportional to pd across its ends,ie VoltageV=IR
   I-current,R or X-resistance , or R or X=V/I
   Then X_1= V/I and X_2= V'/I'
   Connection diagram



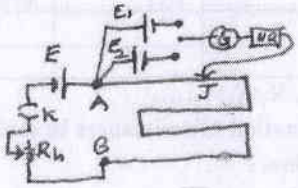
X - unknown resistance
E - Cell
R_h - Rheostat
V - Voltmeter
K - Key
A - Ammeter

observation&calculation

Trial no	I(A)	V(v)	X_1=V/I (Ω)	Trial no	I'(A)	V'(v)	X_2=V'/I' (Ω)

X_1=.....Ω , X_2=.....Ω , X_1/X_2=.....

9. **Compare the emf's of two cell using potentiometer**
   If l_1 balancing length for E_1 and l_2 balancing length for E_2 then Ratio of emf $E_1/E_2=l_1/l_2$



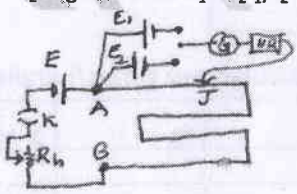
E_1 & E_2 - cell
G - galvanometer
HR - High resistance
R_h - rheostat
J - jockey
K - Key

Observations and calculations

Trial no	Balancing length		$E_1/E_2=l_1/l_2$
	For E_1 ,(l_1)	For E_2(l_2)	

Ratio of emf=.....

10. **Find the emf of the given cell using potentiometer, emf of another cell is.....**
    If l_1 balancing length for E_1 and l_2 balancing length for E_2 then Ratio of emf $E_1/E_2=l_1/l_2$
    If E_2 is given then $E_1= E_2l_1/l_2$



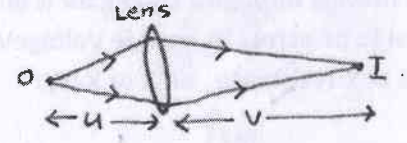
E_1 & E_2 - cell
G - galvanometer
HR - High resistance
R_h - rheostat
J - jockey
K - key

Observations and calculations

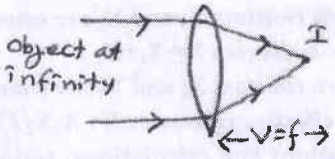
Trial no	Balancing length		$E_1/E_2=l_1/l_2$
	For E_1 ,(l_1)	For E_2(l_2)	

Emf of cell, $E_1= E_2l_1/l_2$=..... v

11. **Find the focal length of given convex lens by UV method. Verify by distant object method**
    UV method:If u is the object distance and v image distance, then focal length,f=uv/u+v



***Distant object method:when the object is at large distance the image is formed at focus. Distance between image and lens is focal length**



Observations and calculations:(1) uv method

Trial no	U (cm)	V(cm)	f=uv/u+v

mean f=uv/u+v = ...cm =.....m

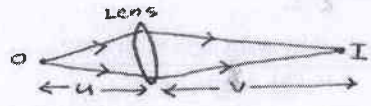
(2) distant object method

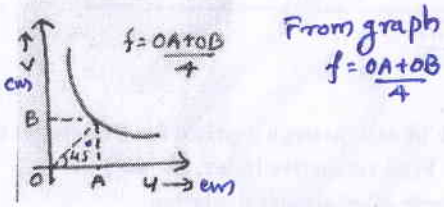
Trial no	Focal length (cm)

Mean Focal length=.....cm =.....m

12. Find the focal length of given convex lens by UV graph. Also find power of lens

If u is the object distance and v image distance, then focal length=uv/u+v





Power of lens is given by ,p=1/f ,where f is the focal length in meter. Unit is diopter(D)

observations&calculations

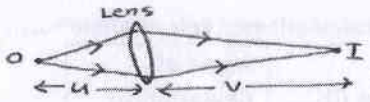
Trial no	U (cm)	V(cm)

From graph OA=...cm. OB=...cm,f= OA+OB/4= ...m

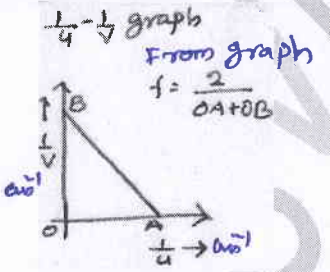
Power p= 1/f = ...D

13.Find the focal length of given convex lens by 1/U-1/V graph. Take at least six sets of readings

If u is the object distance and v image distance, then focal length,f=uv/u+v



1/u- 1/v graph



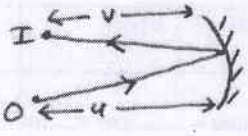
observations&calculations

Trial no	U (cm)	V(cm)	1/u (cm^{-1})	1/v (cm^{-1})

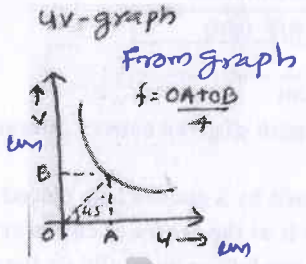
From graph OA=....cm^{-1}, OB=....cm^{-1}. f= 2/OA+OB=..m

13.Find the focal length of given concave mirror using UV graph with at least six sets of readings

If u is the object distance and v image distance, then focal length,f=uv/u+v



Uv- graph



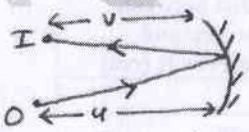
observations&calculations

Trial no	U (cm)	V(cm)

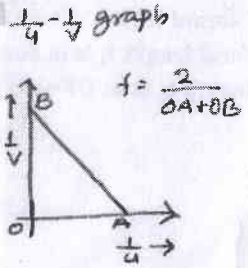
From graph OA=...cm. OB=...cm,f= OA+OB/4= ...m

13. Find the focal length of given concave mirror using 1/U- 1/V graph with at least six sets of readings.

If u is the object distance and v image distance, then focal length,f=uv/u+v



1/u-1/v graph



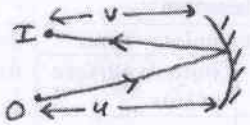
observations&calculations

Trial no	U (cm)	V(cm)	1/u (cm^{-1})	1/v (cm^{-1})

From graph OA=....cm^{-1}, OB=....cm^{-1}. f= 2/OA+OB=..m

14. Find the focal length of given concave mirror using UV method with at least six sets of readings. Verify using normal incidence method

<u>Uv- method</u>:If u is the object distance and v image distance, then focal length,f=uv/u+v



<u>Normal incidence method:</u>

If the object is at the center of curvature of concave mirror ,image is formed at the same position .Then the distance between the mirror and the object gives radius of curvature then focal length f=R/2

<u>Observations and calculations:(1) uv method</u>

Trial no	U (cm)	V(cm)	f=uv/u+v (cm)

mean f=uv/u+v = ...cm =.....m

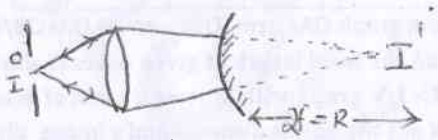
(2)Normal incidence method

Trial no	F=R/2 (cm)

Mean f =...cm=....m

15. Fond the focal length of given convex mirror using convex lens

If the image formed by a convex lens placed in front of a convex mirror is at the centre of curvature of the mirror ,the rays are falling normally on the mirror . Then the distance between the mirror and image formed by convex lens is radius of curvature of the mirror. Then focal length f=R/2



observations&calculations

Trial no	Dist between screen and mirror,R (cm)

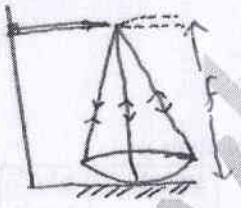
Mean R=.....cm=.....m

Focal length f=....m

16. Find the focal length of liquid lens

When a convex lens of focal length f_1 is in contact with a concave lens of focal length f_2 then $1/F=1/f_1+1/f_2$

There fore $f_2= Ff_1/f_1-F$



observations&calculations

focal length of convex lens

no	Distance of the pointer from		Average distance(cm)
	Top surface of lens	Bottom surface of lens	

Focal length of convex lens=.....m

Focal length of combination

no	Distance of the pointer from		Average distance(cm)
	Top surface of lens	Bottom surface of lens	

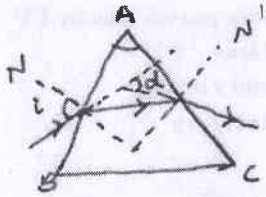
Focal length of combination,F=.....m

Focal length of liquid lens, $f_2= Ff_1/f_1-F$

17. Plot the i-d curve of the given prism. From the graph find the angle of minimum deviation

Refractive index of material of prism is given by, $n=\frac{\sin(A+D)/2}{\sin A/2}$

A=angle of prism,D=angle of minimum deviation



observations&calculations:Angle of prism=.....

no	Angle of incidence (i)	Angle of deviation(d)

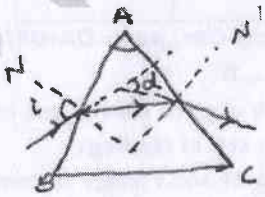
$n=\frac{\sin(A+D)/2}{\sin A/2}$ =

18. Draw path of ray through a prism for five angles of incidence. Find refractive index. ($A=60^0$)

find the angle of minimum deviation

Refractive index of material of prism is given by, $n=\frac{\sin(A+D)/2}{\sin A/2}$

A=angle of prism,D=angle of minimum deviation



observations&calculations:Angle of prism=.....

no	Angle of incidence (i)	Angle of deviation(d)

$n=\frac{\sin(A+D)/2}{\sin A/2}$