Experiment No.: 01

Name of the Experiment:
Familiarization with Vernier Calipers and Screw Gauge by measuring various samples

Data Collection:

Table 1: Reading for Measurement of the length of the sample (using slide Calipers)

Dimension to be measured	No. of obs.	Main scale reading (M.S.R) cm	Vernier scale divisions (V.S.D)	Vernier constant (V.C) (cm)	Vernier scale reading (V.S.R) = (V.S.D × V.C) cm)	Total length/breadth/Thickness, l/b/h (M.S.R + V.S.R) (cm)	Average	Volume of the Iron block (V) cm^3
Length of Iron block	1							
	2							
	3							

Table 2: Reading for Measurement of the radius of the sample (using Screw Gauge)

No. of obs.	Liner scale reading (L.S.R) cm	Circular scale divisions (C.S.D)	Least count (L.C) (cm)	Circular scale reading (C.S.R) = (C.S.D × L.C)	Total diameter (D) = (L.S.R + C.S.R) (cm)	Mean diameter D (cm)	Volume of the Lead Shot (V) (cm^3)
1							
2							
3							

Experiment No.: **02**

Name of the Experiment:
To determine the value of g, acceleration due to gravity, by means of a Compound Pendulum

Data Collection:

Table 1: Data for time period

Starting direction	Hole no.	Distance from Top (cm)	Time for 10 oscillations (sec)	Mean Time, t (sec)	Mean Time Period, $T = \frac{t}{10}$ (sec)
Forward	1	5	(i) (ii)		
	2	10	(i) (ii)		
	3	15	(i) (ii)		
	4	20	(i) (ii)		
	5	25	(i) (ii)		
	6	30	(i) (ii)		
	7	35	(i) (ii)		
	8	40	(i) (ii)		
	9	45	(i) (ii)		
Reverse	1	55	(i) (ii)		
	2	60	(i) (ii)		
	3	65	(i) (ii)		
	4	70	(i) (ii)		
	5	75	(i) (ii)		
	6	80	(i) (ii)		
	7	85	(i) (ii)		
	8	90	(i) (ii)		
	9	95	(i) (ii)		

Experiment No: 03

Name of the Experiment:
To determine the spring constant and effective mass of a given spiral spring

Data Collection:

Table 1: Data of time period for different masses

No. of obs.	Loads m_0 (gm)	Extension l (cm)	Times for 10 oscillation		Total Period $T = \frac{t}{10}$ (sec.)		Mean T (sec)	T^2
			t_1	t_2	$T_1 = \frac{t_1}{10}$	$T_2 = \frac{t_2}{10}$		
1								
2								
3								
4								
5								

Mass of Spring = 75g

Experiment No.: 04

Name of the Experiment:

Determination of the Young's Modulus by the flexure of a beam

Data Collection:

Length of the beam, l = …. cm

Table 1: Data for load versus elongation

Additional Load on hanger (kg)	Readings for the elongation, x										Mean reading (cm)	Mean depression y_0 (cm)
	Load increasing					Load decreasing						
	L.S.R (cm)	C.S.D	L.C (cm)	C.S.R = (C.S.D × L.C) (cm)	Total Reading =(L.S.R + C.S.R) (cm)	L.S.R (cm)	C.S.D	L.C (cm)	C.S.R = (C.S.D × L.C) (cm)	Total Reading =(L.S.R + C.S.R) (cm)		

Table 2: Measure the breadth, (b) of beam

No. of obs.	Main scale reading (M.S.R) (cm)	Vernier scale divisions (V.S.D)	Vernier constant (V.C) (cm)	Vernier scale reading (V.S.R) = (V.S.D × V.C) (cm)	Total breadth (b) = (MSR+VSR) (cm)	Mean Breadth b (cm)
1						
2						
3						

Table 3: Measure the depth, (d) of beam

No. of obs.	Main scale reading (M.S.R) (cm)	Vernier scale divisions (V.S.D)	Vernier constant (V.C) (cm)	Vernier scale reading (V.S.R) = (V.S.D × V.C) (cm)	Total depth d = (MSR+VSR) (cm)	Mean depth d (cm)
1						
2						
3						

Young's modulus of the material, Y= $\frac{mgl^3}{4bd^3x}$ **= dyne/cm^2**

Experiment No.: 05

Name of the Experiment:

To determine the modulus of rigidity of a wire by Statical method using Barton’s apparatus

Data Collection:

Table 1: Diameter of the fly-wheel (heavy cylinder)

No. of obs.	Main scale reading (M.S.R) (cm)	Vernier scale divisions (V.S.D)	Vernier constant (V.C) (cm)	Vernier scale reading (V.S.R) = (V.S.D × V.C) (cm)	Total Diameter D = (MSR+VSR) (cm)	Mean Diameter d (cm)
1						
2						
3						

Table 2: Radius of the wire (using screw gauge)

No. of obs.	Liner scale reading (L.S.R) (cm)	Circular scale divisions (C.S.D)	Least count (L.C) (cm)	Circular scale reading (C.S.R) = (CSD × L.C)	Total diameter D = (LSR+CSR) (cm)	Mean diameter D (MSR+VSR) (cm)	Mean radius r=D/2 (cm)
1							
2							
3							

Table 3: Reading for load-twist graph

No. of Obs.	Load in each hanger (gm)	Pointer reading in degrees				Mean pointer reading		Mean twist $(\varphi 2^\circ - \varphi 1^\circ)$
		Scale S_1		Scale S_2		S_1 $(\varphi 1^\circ)$	S_2 $(\varphi 2^\circ)$	
		Load increasing	Load decreasing	Load increasing	Load decreasing			
1								
2								
3								
4								
5								

Calculations: $\mathbf{n} = \frac{360\, l\, g\, d}{\pi^2 r^4}\ x\ \frac{m}{(\varphi_2^\circ - \varphi_1^\circ)}$

<u>Experiment No.:</u> 06

<u>Name of the Experiment:</u>

To determine the modulus of rigidity of a wire by method of oscillations (dynamic method)

<u>Data collection:</u>

Length of the wire, L = …. cm

Table 1: Readings for the Radius of the cylinder, R (using slide calipers)

No. of obs.	Main scale reading (M.S.R) (cm)	Vernier scale divisions (V.S.D)	Vernier constant (V.C) (cm)	Vernier scale reading (V.S.R) = (V.S.D × V.C) (cm)	Total diameter D = (MSR+VSR) (cm)	Mean diameter D (cm)	Mean radius R= D/2 (cm)
1							
2							
3							

Table 2: Radius of the wire, r (using screw gauge)

No. of obs.	Liner scale reading (L.S.R) (cm)	Circular scale divisions (C.S.D)	Least count (L.C) (cm)	Circular scale reading (C.S.R) = (CSD × L.C)	Total diameter D = (LSR+CSR) (cm)	Mean diameter D (cm)	Mean radius r=D/2 (cm)
1							
2							
3							

Table 3: Reading for the time period T.

No. of obs.	Time for 20 oscillations, t (see)	Period of oscillation $T = \frac{t}{20}$ (sec)	Mean T. (sec)
1			
2			
3			

<u>Calculations</u>:

1. $I = \frac{1}{2}\, m\, R^2$
2. $\mathbf{n = \frac{8\pi IL}{T^2 r^4}}$ **dynes/cm²**

Experiment No.: 07

Experiment Name:

To determine the refractive index of the material of a prism

Data Collection:

Table 1: Determination of angle of Prism

No. of obs.	Readings for image in the face AB of the prism					Readings for image in the face AC of the prism					Difference in readings at the two face (θ=M-N)	Mean (θ) of the two venires	Angle of the prism A=θ/2
	M.S.R	V.S.D	V.C	Value of V.S.R	Total Reading N	M.S.R	V.S.D	V.C	Value of V.S.R	Total Reading M			
1													
2													
3													

Table 2: Determination of angle of minimum deviation

No. of obs.	Readings for the minimum deviation position					Readings for the direct position					Angle of minimum deviation (δm)=(M-N)	Mean (δm)
	M.S.R	V.S.D	V.C	Value of V.S.R	Total Reading N	M.S.R	V.S.D	V.C	Value of V.S.R	Total Reading M		
1												
2												
3												

Calculation:

The refractive index of the material of Prism is

$$\mu = \frac{\sin\frac{A+\delta m}{2}}{\sin\frac{A}{2}}$$

Experiment Number-08

Name of the Experiment: To calibrate a Polarimeter and hence to determine the specific rotation of a sugar solution by means of a Polarimeter.

Data Collection:

Table for angular rotation

Strength of sugar solution (%)	**No. of obs**	**First reading with water (P)**	**Second reading with solution (Q)**	**Angular rotation (Q~P)**	**Mean angular rotation**	**Specific rotation (s)**
20%						
10%						
5%						

Specific rotation = $\frac{10\theta}{lc}$

Experiment Number-9

Experiment Name: Determination of moment of inertia of a flywheel about its axis of rotation.

Data Collection:

Table 1: Determination of n_1, n_2 and t:

Mass M gm	Height h cm	No. of Revolutions n_1	Average n_1	No. of Revolutions n_2	Average n_2	Time t	Average t	Moment of Inertia I	Average I

Table 2: Determination of the radius of the axle:

LSR (X) (cm)	VSD	VC (cm)	VSR Y =(VSD×VC) (cm)	Total Reading = X+Y cm	Average Diameter cm	Radius r cm

Calculation:

$\omega = \frac{4\pi n_2}{t}$ and $I = \frac{2mgh - m\ \omega^2 r^2}{\omega^2 (1+\frac{n_1}{n_2})}$

<u>Experiment Number-10</u>

Name of the Experiment: To determine the Specific resistance of a wire using a Meter Bridge

<u>Data Collection:</u>

Table 1: Reading for the Galvanometer balance point.

No. of observation	**Value of resistance, R(Ω)**	**Length, l cm**	**$(100 - l)$ cm**	$X = \frac{R(100-l)}{l}$ (Ω)	**Mean X(Ω)**
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Table 2: Reading for the radius of the experimental wire. (Using Slide Calipers)

No. of obs.	Liner scale reading (L.S.R) cm	Circular scale divisions (C.S.D)	Least count (L.C) cm	Circular scale reading (C.S.R) = (CSD x L.C) cm	Total diameter D cm	Mean diameter D cm	Mean radius r=D/2 cm
1							
2							
3							

Specific Resistance

$$\rho = \frac{\pi r^2 X}{L}$$

Experiment Number-11

Name of the Experiment: To determine the e.m.f of a cell with a potentiometer of known resistance

<u>Data collection:</u>

(A) Resistance of the potentiometer wire, R = 72 Ω

(B) Total length of the potentiometer, L= 1000 cm.

No. of obs.	Miliammeter readings i mA	Null points		Total length for balance l cm	e.m.f of the cell $E=\frac{iRl}{1000L}$ Volts.	Mean E' Volts.
		On wire number	Scale reading in cm			
1		10th				
2		9th				
3		8th				
4		7th				

Experiment Number-12

Name of the Experiment: To determine the value of unknown resistance and verify the laws of series and parallel resistance by Post Office Box.

Data collection:

Table 1: Reading for the Unknown resistance.

Value of P (Ω)	Value of Q (Ω)	Value of R (Ω)	Value of S $= \frac{QxR}{P}$(Ω)	Mean , S(Ω)
10	10			
10	100			
100	1000			

Table 2: Reading for the series resistance, S_s

Value of P (Ω)	Value of Q (Ω)	Value of R (Ω)	Series resistance, $S_s=\frac{QxR}{P}$(Ω)	Mean S_s(Ω)
10	10			
10	100			
100	1000			

Table 3: Reading for the parallel resistance, S

Value of P (Ω)	Value of Q (Ω)	Value of R (Ω)	Parallel resistance $S_p=\frac{QxR}{P}$(Ω)	Mean, S_p(Ω)
10	10			
10	100			
100	1000			