<u>Experiment No.:</u> 01

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

<u>Data Collection:</u>

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

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

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

<table>
<tr><th>No. of obs.</th><th>Liner scale reading (L.S.R) cm</th><th>Circular scale divisions (C.S.D)</th><th>Least count (L.C) (cm)</th><th>Circular scale reading (C.S.R) = (C.S.D × L.C)</th><th>Total diameter (D) = (L.S.R + C.S.R) (cm)</th><th>Mean diameter D (cm)</th><th>Volume of the Lead Shot (V) (cm^3)</th></tr>
<tr><td>1</td><td></td><td></td><td></td><td></td><td></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

<u>Experiment No.:</u> 02

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

<u>Data Collection:</u>

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 oscillations		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

<u>Experiment No.:</u> 04

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

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

<u>Data Collection:</u>

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 surface tension of water by capillary tube method

Data collection:

Table 1: Measurement of inside radius (r) of the tubes

Tube no.	Readings in cm for the bore										Difference diameter $D=X_2 \sim X_1$ (cm)	Radius $r=D/2$ (cm)	Mean Radius r
	Left side (X_2)					Right side(X_1)							
	M.S.R (cm)	V.S.D	V.C (cm)	VSR = (V.S.D ×V.C) (cm)	Total Reading (x_1) = (M.S.R+ V.S.R) (cm)	M.S.R (cm)	V.S.D	V.C (cm)	VSR = (V.S.D ×V.C) (cm)	Total Reading (x_2) = (M.S.R+ V.S.R) (cm)			
A													
B													

Table 2: Determination of the height of the column of water 'h'

No. of observation	Reading of the water meniscus					Reading at the tip of pointer					Height h $=h_1 \sim h_2$ (cm)	Mean Height h
	M.S.R (cm)	V.S.D	V.C (cm)	V.S.R = (V.S.D ×V.C) (cm)	Total Reading (h_1)= (M.S.R+ V.S.R) (cm)	M.S.R (cm)	V.S.D	V.C (cm)	V.S.R = (V.S.D ×V.C) (cm)	Total Reading (h_2)= (M.S.R+ V.S.R) (cm)		
1												
2												
3												
4												

Experiment No.: 06

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

Experiment No.: **07**

Name of the Experiment:

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

Data collection:

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			

Calculations:

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

Experiment No.: **09**

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 No.: 12

Name of the Experiment:
To determine the value of g, acceleration due to gravity, by means of Kater's Pendulum

Data Collection:

1. Distance between K_1 and CG (h_1)=……..cm

2. Distance between K_2 and CG (h_2)=……..cm

Table for time period T_1 (oscillation about K_1)

No. of Observation	Number of Oscillation, n	Time of Oscillation t_1 (sec)	Time Period $T_1 = \frac{t_1}{n}$(sec)	Mean Time T_1(sec)
1				
2				
3				
4				
5				

3. Table for time period T_2 (oscillation about K_2)

No. of Observation	Number of Oscillation, n	Time of Oscillation t_2 (sec)	Time Period $T_2 = \frac{t_2}{n}$ (sec)	Mean Time T_2(sec)
1				
2				
3				
4				
5				