4. TENSION TEST ON CLOSED COILED HELICAL SPRING

AIM :

To conduct a tension test on the given helical spring and hence determine the following a) Shear modulus b) Stiffness of the spring.

APPARATUS :

1. Spring testing machine
2. Vernier caliper
3. Scale

MACHINE DESCRIPTION :

The machine mainly consists of loading mechanism, load measuring system, indicating mechanism, recorder and electrical controls.

Loading mechanism:

The base is connected to torque plate by two columns forming the main structure of the machine. The measuring system is assembled on top plate and is covered by top cover. The side panel fixed to the right column consists of indicating and recording mechanisms

Load measuring systems (Pendulum dynamometer):

The load measuring system is supported on the top plate and is covered by the top cover.The upper grip head is fixed to the central member .A spring steel strip with one end fixed to the pendulum shaft runs around the shaft and its end is fixed to the central member.

Indicating mechanism :

The rack pusher fixed to the pendulum lower pushes the rack which slides over the rack guide pulleys .The lower movement of the rack rotates the pinion .The pinion is fixed on a pointer shaft running in ball bearing. A dummy pointer which moves forward with the main pointer is provided for maximum load reading .

PROCEDURE :

1. Measure the mean coil diameter and the diameter of wire of the spring .Also note the number of free coils in the spring .
2. Place the spring in position by attaching it to hooks for tension spring .
3. Adjust the indicator of the load dial ,to read 0 .
4. Apply tensile load by increasing at suitable intervals and note the corresponding deflections .
5. Draw graph - load vs deflection.

OBSERVATION :

Mean coil diameter (D) =

Wire diameter (d) =

No. of free coils (n) =

TABULATION :

S.No	Load (N)	Deflection (mm)			Stiffness N/mm	Shear stress N/mm^2	Rigidity modulus N/mm^2	Strain energy N-mm
		Loading	Unloading	Mean				
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

CALCULATION:

Rigidity modulus (G) $= \dfrac{64\ R^3 n}{d^4} \times \dfrac{w}{\delta}$

Stiffness of the spring (K) $= \dfrac{w}{\delta}$

Shear stress (τ) $= \dfrac{16\ w R}{\pi d^3}$

Strain energy stored (Uwp) $= \frac{(\tau)^2}{4\,G} \times \frac{\pi d^2}{4} \times \pi Dn$

RESULT :

Rigidity modulus =

Stiffness of the spring =

Proof load =

Strain energy stored at proof load =

ain rgy nm

5. TORSION TEST ON MILD STEEL ROUND BAR

AIM:

To conduct a torsion test on the given mild steel wire and hence determine the modulus of rigidity .

APPARATUS :

1. Torsion testing machine
2. Vernier caliper.
3. Scale

MACHINE DESCRIPTION:

The machine consists of two units namely, loading unit and the measuring control panel. It consists of robust base fitted with control panel. The gear box assembly is guided on the base. A driving chuck and angle measuring pulley is mounted on a lever spindle assembly is connected to a pendulum dynamometer. The autographic recorder is fitted on the control panel .The recorder will show the relation between torque and twist angle

PROCEDURE :

1. Measure the diameter of the specimen in both perpendicular directions and take the average .
2. Fix the specimen between the driving chuck and the driven chuck.
3. Set the angle measuring dial at 0^{o} position.
4. Now apply torque to the specimen.
5. Note the torque readings by changing the angle of twist.
6. Draw the graph torque Vs angle of twist.

OBSERVATIONS :

Length of the specimen (l) =

Diameter of the specimen (d) =

TABULATION :

Sl . No	Angle of twist (θ)		Torque (T)		Rigidity modulus (G) N/mm2
	degree	radians	kg f –cm	N- mm	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

CALCULATIONS

Polar M.I. (J) $= \dfrac{\pi d^3}{32}$

Rigidity modulus (G) $= \dfrac{T}{\theta} \times \dfrac{l}{J}$

RESULT:

Modulus of rigidity of the given material is =