EXPERIMENT NO. 5

Aim: To find the spring constant of a helical spring from the load-extension graph.

Apparatus: Helical spring, stand, meter scale, hanger, slotted weights, pointer.

Theory: By Hooke's law,

Force applied α extension

$$F \ \alpha \ x$$

$F = kx$; where k is the spring constant

SI unit of k - N/m

Procedure:

1. Suspend the spring from the rigid support
2. Attach a pointer to the lower end.
3. Note the reading of the pointer
4. Add 50 g wt. To the hanger and note the reading on the scale
5. Repeat the steps by adding 50 g wt in each step
6. Now unload the hanger step by step and note the pointer readings.
7. Plot the graph of l along y-axis and F along x-axis
8. Calculate the slope of the graph
9. Take the inverse of the slope of the graph to get the spring constant

Observation and calculation:

Observation Table

Sr. No.	(Load in hanger) g. wt	Pointer Reading			Extension x (cm)
		Loading P_1 (cm)	Unloading P_2 (cm)	Mean $\frac{(P_1 + P_2)}{2}$	
1	150 (dead wt.)				0
2	200				
3	250				
4	300				
5	350				

Slope of the graph =

Spring constant =

Result: Spring constant of the given spring = _____ Nm^{-1}

Precautions:

1. Do not load the spring beyond elastic limit
2. While taking the reading on the scale, keep the eye in level with the pointer.
3. Take the reading of the pointer on the scale after the pointer has come to rest.
4. The pointer should not touch the scale.
5. Loading and unloading should be done gradually.

Sources of error :

1. Support may not be rigid.
2. The slotted weights may not have accurate weight.

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