EXPERIMENT NO. 5

Aim: To find the spring constant of a helical spring by the method of oscillation using different masses.

Apparatus: Spiral spring, stand, meter scale, hanger, slotted weights, pointer, stop watch.

Theory: The time period of an oscillating spring is given by :

$$T = 2\pi\sqrt{\frac{m}{k}}$$ **; where, m is the mass and k is the spring constant.**

$$\therefore \quad k = 4\,\pi^2\,\frac{m}{T^2} \quad \text{----------(1)}$$

Procedure :

1. **Suspend the spring from the rigid support.**
2. **Attach a suitable load say 150 g to the spring.**
3. **Pull the load down through a small distance and release it.**
4. **The load suspended by the spring would start executing vertical oscillations.**
5. **Using the stop watch, find time for 20 oscillations and calculate the time period.**
6. **Draw a graph between m and T^2, find the ratio m/ T^2 from the graph.**
7. **Substitute the value of m/ T^2 in equation (1)**

Observations :

Sr. No	Mass of the load - 'm' (kg)	Time for 20 oscillations (s)			Time period T (s)	T^2 (s^2)
		T_1	T_2	mean		
1	0.15					
2	0.20					
3	0.25					
4	0.30					
5	0.35					

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

Precautions:

1. **Do not load the spring beyond elastic limit**
2. **The load suspended from the spring should oscillate in the vertical plane**
3. **The amplitude of the oscillations should be small**
4. **Time should be measured accurately.**

Sources of error:

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

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