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LABORATORY WORK SHEET

Date: ....

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Exp No: 10 Experiment Name: longitudinal vibration of helical spring

DAY TO DAY EVALUATION:

	Preparation	Algorithm / Performance in the Laboratory	Source Code / Calculations and Graphs	Program Execution / Results and Error Analysis	Viva voce	Total
Max. Marks	5	5	10	5	5	30
Obtained	4	4	4	4	3	19

Signature of Lab I/C

START WRITING FROM HERE:

Aim: To study the longitudinal vibration of helical spring and to determine the frequency and time period of oscilation.

Description:

One end of open coil spring is fixed to the nut having a hole which itself is mounted on a ms strip fixed on one side of the main frame the lower end of the spring is attached to the platform carrying the weight.

Procedure:

-> fix one end of the helical spring to upper screw
-> Determine free length
-> put some weight to platform and notedown the deflection.
-> stretch the spring through some distance and relax.

Calculation:

* stiffness $(\mu) = \frac{w}{s}$ $K_1 = 3.75$

$K_2 = 12.0$

$K_3 = 14.95$

* mean stiffness $(\mu m) = \frac{3.75 + 12 + 14.95}{3} = 10.23$

* theoritical time $= \sqrt{\frac{w}{Km} \times g}$

* Actual time Period = t/n sec

* Actual frewuency font = $\frac{1}{Tact}$

* count the time rewuried in sec for say 10.20 oscillation

* Determine the actual Period

* Repeat the Procedure for different weights.

Formula ÷

-> stiffness $(K) = \frac{w}{s}$ kg/cm

-> mean stiffness $(Km) = K_1 + K_2 + K_3 / 3$

-> theoritical time period (Tact) = ~~Km~~ sec $= \sqrt{\frac{w}{Km} \times g}$

-> Actual time Period (Tact) = t/n sec

-> Actual frewuency (F act) = $\frac{1}{Tact}$

Observation ÷

S.NO	weight attached (g)	Deflection in spring (tm) (cm)	stiffness (K) (kg/cm)	mean stiffness (km/kg)
1.	150	110	3.75	
2.	500	41.4	12.0	10.23
3.	650	43.5	14.94	

S.No	weight attached (g)	no. of oscillation	Time required for (n) (sec)	Theo exp (sec)	Theo exp (sec)	F the (Hz)	Fexp (Hz)
1.	150	10	4	1.49	4	0.4	2.5
2.	500	10	4.65	4.48	4.65	0.465	2.15
3.	650	10	5.72	6.47	5.7	0.57	1.75

Precautions:

* Do the experiment properly
* Keep the loads accordingly
* stay for, while the load is been oscillated.

Result:

The frequency and time-period oscillation of the longitudinal helical spring is being determined.

S.No	weight	Deflection	Time (sec)	mean (km)	Tact	Tth	Fact	Fth
1.	500	4	5.3	9.1	0.53	4.61	1.8	0.2
2.	1000	6	5.7	9.1	0.57	6.52	1.75	0.2

$$K_m = \frac{W}{\delta} = \frac{K_1+K_2}{2} = \frac{10.75+7.5}{2} = 9.1$$

$$K_1 = \frac{W}{\delta} = \frac{43}{4} = 10.75$$

$$K_2 = \frac{45}{6} = 7.5$$

Time theoritical $(T_{th}) = 2\pi \times \sqrt{\frac{W}{K_m} \times g}$

$$= 2\pi \times \sqrt{\frac{500 \times 10^{-3}}{9.1} \times 9.81}$$

$$= 4$$

$$T_{act} = \frac{T}{n} = \frac{53}{10} = 0.53\ sec$$

$$F_{th} = \frac{1}{T_{th}} = \frac{1}{4.61} = 0.21$$

$$F_{act} = \frac{1}{T_{act}} = \frac{1}{0.53} = 1.88\ Hz$$