INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad – 500 043

LABORATORY WORK SHEET

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Exp No: 06 Experiment Name: DETERMINING FREQUENCY OF LONGITUDINAL WAVES

DAY TO DAY EVALUATION:

	Preparation	Algorithm / Performance in the Lab	Source Code / Calculations and Graphs	Program Execution / Results and Error Analysis	Viva	Total
Max. Marks	4	4	4	4	4	20
Obtained	4	4	4	4	4	20

Signature of Lab I/C

START WRITING FROM HERE:

AIM: To determine the frequency of a tuning fork in longitudinal mode and transverse mode using Melde's arrangement.

APPARATUS:
1. Melde's arrangement
2. Rheostat
3. Plug keys
4. Connecting wires.
5. Meter scale
6. Thread
7. Weight box
8. Power supply

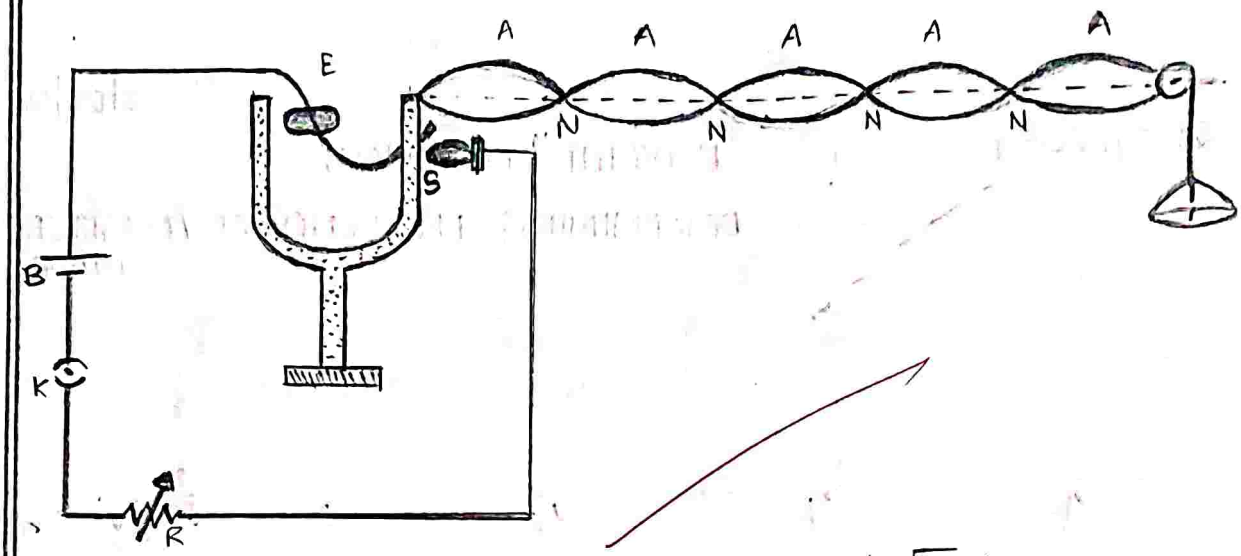
PRINCIPLE: Frequency of tuning fork $n = \frac{1}{l}\sqrt{\frac{T}{m}}$ Hz.

m - mass per unit length

l - length of a single loop.

T = Tension = (M+m)g

LONGITUDINAL MODE :



FREQUENCY OF TUNING FORK $n = \frac{1}{l}\sqrt{\frac{T}{m}}$ Hz

OBSERVATION TABLE :

S.No	LOAD APPLIED IN THE PAN (M) gm	TENSION $T=(M+p)g$	NO. OF LOOPS (x)	LENGTH OF THE x LOOPS (a) (cm)	LENGTH OF THE EACH LOOP $l=\frac{a}{x}$	$n_1 = \frac{1}{l}\sqrt{\frac{T}{m}}$
	5	(5+21)980	4	100	$\frac{100}{4}=25$	65.85
	15	(15+21)980	3	100	$\frac{100}{3}=33.3$	58.17
	50	(50+21)980	2	100	$\frac{100}{2}=50$	54.41

Average of n = 59.47 Hz

Mass of pan(p) = 21 gm

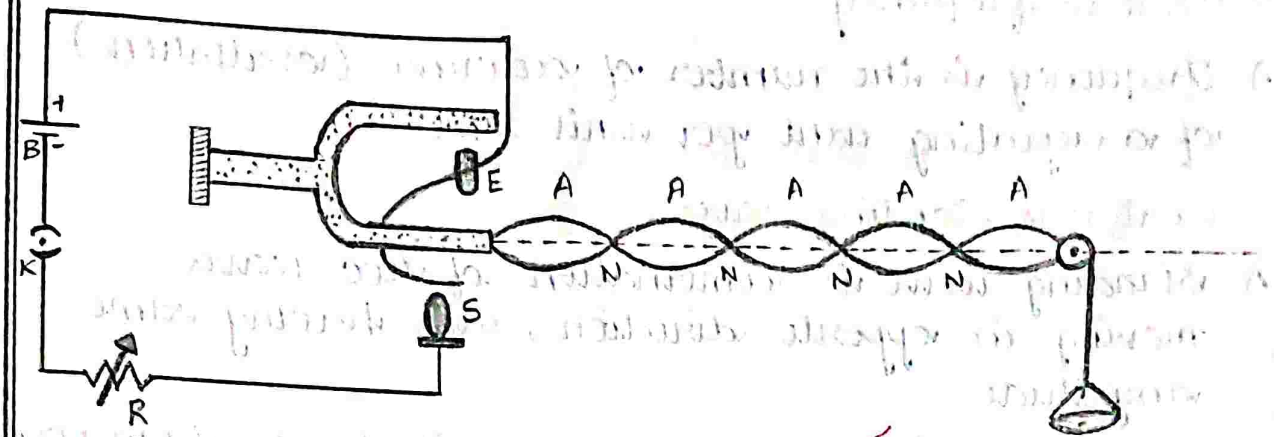
Length of thread (L) = 100 cm

Linear density (m) = 0.0094 gm/cm

RESULT :

Frequency of tuning fork in longitudinal mode = 59.47 Hz

TRANSVERSE MODE:



FREQUENCY OF TUNING FORK = $\frac{1}{2l}\sqrt{\frac{T}{m}}$ Hz

OBSERVATION TABLE:

Mass of pan (P) = 21gm Length of thread (l) = 100cm

Linear density (μ) = 0.0094gm/cm

S.NO	LOAD APPLIED IN THE PAN (M) gm	TENSION T=(M+P)g	NO. OF LOOPS (x)	LENGTH OF THE x LOOPS (cm)	LENGTH OF THE EACH LOOP $l=\frac{l}{x}$	$n=\frac{1}{2l}\sqrt{\frac{T}{m}}$
	5	(5+21)980	7	100	$\frac{100}{7}$ = 14.2	57.97
	15	(15+21)980	6	100	$\frac{100}{6}$ = 16.6	58.35
	50	(50+21)980	5	100	$\frac{100}{5}$ = 20	68.01
	60	(60+21)980	4	100	$\frac{100}{4}$ = 25	58.11

Average of n = 60.61Hz

RESULT:

Frequency of tuning fork in transverse mode = 60.61 Hz

VIVA VOCE :

1. What is frequency ?

A. Frequency is the number of occurences (oscillations) of a repeating event per unit time.

2. What are standing waves ?

A. Standing wave is combination of two waves moving in opposite direction, each having same amplitude.

3. Explain the difference between longitudinal & transverse waves.

A. In a longitudinal wave, the medium moves in same direction with respect to wave. In a transverse wave the medium moves perpendicular to direction of wave.

4. What is resonance ?

A. Resonance is a phenomenon in which an element force vibrate with greater amplitude to a specific frequency of operation.

5. Define nodes & anti-nodes.

A. A node is a point along a standing wave where the wave has minimum amplitude to a specific frequency of operation. Antinodes are where the amplitude is a maximum.

6. Explain the importance of melde's experiment.

A. Melde's experiment is ideal to study the behaviour of standing wave. It demonstrate the relation b/w the string (the stretching force) & the frequency.

7. Define resonance condition.

A The object must have a minimum of one natural frequency of vibration.