

India's Number 1 Education App

PHYSICS

BOOKS - CHHAYA PHYSICS (BENGALI ENGLISH)

NATURE OF VIBRATION

Example Numerical Examples

1. A second pendulum is shifted 4 cm away

from its equilibrium position and then

released. After 2s the pendulum is 3 cm away from its position of equilibrium. What will be the position of the pendulum after another 2 s?



2. After 100 complete oscillations, a pendulum's amplitude becomes $\frac{1}{3}rd$ of its initial value. What will be its amplitude after 200 complete oscillations? Express it as a fraction of the initial amplitude.





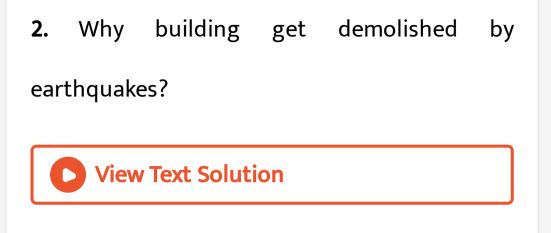
Exercise Higher Order Thinking Skill Hots Questions

1. Why does an empty container emit a louder

sound than a water-filled container when they

are struck?





3. A vibrating tuning fork is held at the mouth of a cylindrical tube. The tube is dipped into water. It is found that when the level of water rises to a definite height, a sound of large intensity is heard. Explain the reason behind it.



4. In presence of a resonant body, the sound produced by a body is intensified, is the principle of conservation of energy violated here?

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1. In case of free vibration of a body, the quantity that remains constant is

A. velocity

B. acceleration

C. time period

D. phase

Answer: C

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2. During vibration, the restoring force is

A. directly	proportional	to	the
displace	ment		
B. directly proportional to the velocity			
C. directly	proportional to	the	kinetic
energy			
D. directly	proportional to	the po	otential
energy			
Answer: A			
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3. During damped oscillation of a body the force that acts is

A. only the restoring force

B. only the resistive force

C. the restoring force along with the

resistive force

D. the restoring force along with the

resistive force

and the external periodic force

Answer: C



4. During damped vibration, the quantity which gradually decrease is

A. velocity

B. phase

C. frequency

D. amplitude

Answer: D



5. In case of resonance, the characteristic property which is the same for free vibration of the body and the external periodic force is

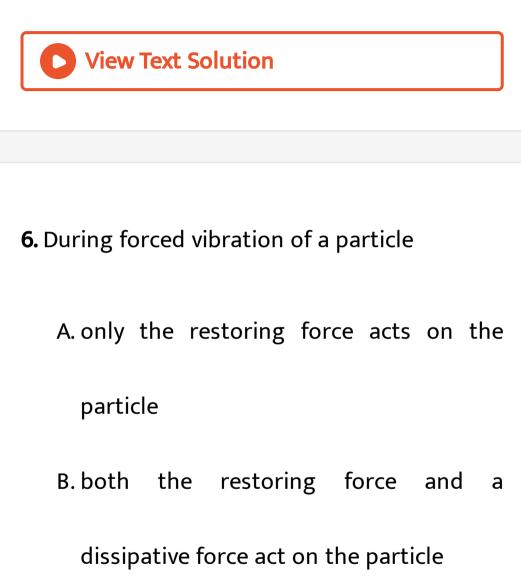
A. amplitude

B. phase

C. velocity

D. frequency





C. both the restoring force and an external

periodic force act on the particle

D. the restoring force, a dissipative force

and an external periodic force act on the

particle

Answer: D

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7. During forced vibration, the frequency of the

external periodic force is

A. equal to

B. less than

C. greater than

D. equal to, or greater than or, less than

the frequency of free vibration of the

body.







8. During forced vibration, if the frequency of free vibration of a body is equal to the frequency of the external periodic force, then the phenomenon that occurs is called

A. beats

B. interference

C. resonance

D. reverberation

Answer: C



9. If a vibrating tuning fork is held at the open end of a tube closed at one end, then for a particular length of the tube an intense sound is heard. This phenomenon is known as

A. beats

B. stationary wave

C. interference

D. resonance

Answer: D

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Exercise Very Short Answer Type Questions

1. Under the influence of which force the oscillation of a pendulum gradually dies out?

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2. Which force acts on body during its free vibration?
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3. Which force acts on a body which vibrates

freely?

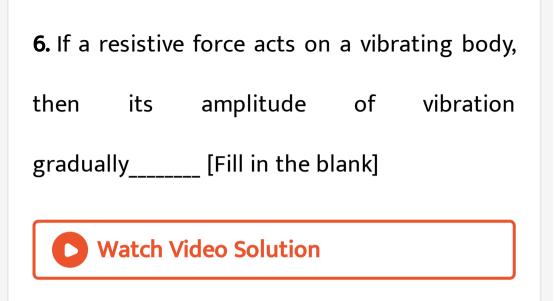


4. A man with a wrist watch falls from a tall building. Will the watch give correct time?

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5. Which quantity of vibration gradually

decreases during damped vibration ?



7. What phenomenon will occur if the frequency of the free vibration of vibrating body becomes equal to the frequency of an external periodic force?

8. Which characteristic of sound increases during resonance? Watch Video Solution **9.** A special case of _____ vibration is resonance. [Fill in the blank]

10. What kind of external force has to act on a

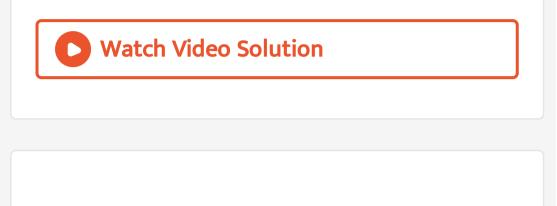
vibrating body, to occur forced vibration?

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Exercise Short Answer Type Questions I

1. A vibrating tuning fork is held at the mouth of a cylindrical tube in which water is poured gradually. Then for a certain height of waterlevel in the tube, an intense sound is heard.

What is the reason behind it?



2. Under which condition does forced vibration

produce resonance ?

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3. All resonances are forced vibrations but all

forced vibrations are not resonances'-



4. Two masses, one heavier than the other, are suspended from two identical springs. These are pulled a little and released. Which mass will vibrate faster and why?



Exercise Short Answer Type Questions li

1. A simple pendulum, set into oscillation, comes to a stop ultimately. Explain with reason.



Exercise Problem Set I

1. In each following cases, the amplitude of the first two oscillations A_1 and A_2 of a damped pendulum are given. What will be the

amplitude of the pendulum in its third oscillation? (i) $A_1 = 3.0cm$. $A_2 = 2.4cm$ (ii) $A_1 = 5.0cm$, $A_2 = 4.9cm$

(iii) $A_1 = 4.0cm, A_2 = 2.0cm$

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2. For a damped oscillator. The mass of the block is 200 g. $k = 90N. m^{-1}$ and the damping constant b is $40g. s^{-1}$. Calculate the period of oscillation.





Exercise Entrance Corner Assertion Reason Type

 Statement I : A vibrating body always moves to and fro about an equilibrium position.
 Statement II : Due to inertia of motion a vibrating body does not stop at its equilibrium position.

A. Statement I is true, statement II is true,

statement II is a correct explanation for

statement I.

B. Statement I is true, statement II is true,

statement II is not a correct explanation

for statement I.

C. Statement I is true, statement II is false.

D. Statement I is false, statement II is true.

Answer: B

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2. Statement I : The sound gets amplified when a vibrating tuning fork is made to touch the surface of a table.

Statement II : Dimension of the table is more than that of the tuning fork.

A. Statement I is true, statement II is true,

statement II is a correct explanation for

statement I.

B. Statement I is true, statement II is true,

statement II is not a correct explanation

for statement I.

C. Statement I is true, statement II is false.

D. Statement I is false, statement II is true.

Answer: A

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Exercise Entrance Corner Integer Answer Type

1. The amplitude of the first two oscillations of

a damped pendulum are 9.0 cm and 3.0 cm

respectively. What will be the amplitude (in

cm) of the pendulum in its third oscillation ?



2. After 50 oscillations a pendulum's amplitude becomes $\frac{1}{3}$ of its initial vibration. If its amplitude becomes $\frac{1}{n^3}$ of its initial vibration after 150 complete oscillations. Then find the value of n.



1. What do you understand by forced vibration

? Draw a graph to show how the amplitude of

forced vibration depends on frequency. Obtain

the condition for resonance from this graph.

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2. What is damped vibration ?



(i) What do you mean by resonance ? (ii)
 Mention any two uses of its from your daily
 life.

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2. What do you mean by resonance?

