O Level Physics Tutorial 10: General Properties of Waves

Syllabus :
(a) describe what is meant by wave motion as illustrated by vibrations in ropes and springs and by waves in a ripple tank (including use of the term wavefront)

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1. Describe what is wave motion in the following cases :

   (a) vibration in a rope

   (b) wave in a ripple tank

(b) show an understanding that waves transfer energy without transferring matter

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2. (i) In a rope wave, what forms of energy are transmitted?

   (ii) What happens to the particles at a point on the rope?

(c) define and use the terms speed, frequency, wavelength, period and amplitude, including graphical representation

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3. (a) Define each of the following for a wave :

   (i) speed
   (ii) frequency
   (iii) wavelength
   (iv) period
   (v) amplitude

   (b) Sketch a graph 2 periods of a wave showing displacement against time. Label a wavelength and an amplitude.

(d) recall and apply the relationship speed of wave = frequency ×wavelength to new situations or to solve related problems

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4. (i) A ripple on a pond has a wavelength of 5 cm and speed of 20 cm/s. Find its frequency.

(ii) A ping pong ball on the pond bobs up and down because of this wave. How many times does it do so every second?

(e) compare transverse and longitudinal waves and give suitable examples of each

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5. (i) Give 2 examples of transverse waves.

(ii) Give 2 examples of longitudinal waves.

(iii) What is the difference between these two types of waves.

(f) show an understanding that sound can be produced by vibrating sources and a medium is required for the transmission of sound.

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6. (a) Give 2 examples of sources that can produce sound.

(b) Give 2 examples of media that can transmit sound.

(g) describe the longitudinal nature of sound waves in terms of the processes of compression and rarefaction

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7. (i) Sketch a picture graph to show the transmission of sound wave. Using small circles to represent air particles, show two periods of the wave.

(ii) Label one region of compression and one region of rarefaction.

(h) relate loudness of a sound wave to its amplitude and pitch to its frequency

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8. State

(i) how loudness is related to amplitude of a sound wave, and

(ii) how pitch is related to frequency.

(i) describe how the reflection of sound may produce an echo, and how this may be used for measuring distances

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9. A boy shouted a short, loud sound at a wall. After 2 s, he heard an echo. Find the distance of the wall from the boy. Speed of sound is 340 m/s.

(j) describe and explain how ultrasound is used, e.g. including sonar and medical scanning of soft tissue

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10. Describe and explain how ultrasound is used in

(i) sonar, and

(ii) medical imaging.