
	<b>INDIAN SCHOOL AL WADI AL KABIR</b>	
<b>Class: XI</b>	<b>Department: SCIENCE 2025 – 26</b> <b>SUBJECT: PHYSICS</b>	<b>Date: 10/02/2026</b>
<b>Worksheet No:14</b> <b>WITH ANSWERS</b>	<b>CHAPTER: WAVES</b>	<b>Note:</b> <b>A4 FILE FORMAT</b>
<b>NAME OF THE STUDENT:</b>	<b>CLASS &amp; SEC:</b>	<b>ROLL NO.:</b>

### OBJECTIVE TYPE QUESTIONS

1. Which one of the following cannot represent a travelling wave?
  - (a)  $y = f(x - nt)$
  - (b)  $y = y_m \sin k(x + nt)$
  - (c)  $y = y_m \log(x - nt)$
  - (d)  $y = y_m \log(x - +nt)$
2. Which of the following statements is wrong?
  - (a) Sound travels in a straight line
  - (b) Sound is a form of energy
  - (c) Sound travels faster in vacuum than in air
  - (d) None of the above
3. In the longitudinal waves, the direction of vibration in the medium of the particle is
  - (a) Perpendicular to the propagation of the wave
  - (b) Parallel to propagation
  - (c) Different from each other
  - (d) None of the above
4. With the propagation of a longitudinal wave through a material medium, the quantities transmitted in the propagation direction are
  - (a) Energy, momentum and mass
  - (b) Energy
  - (c) Energy and linear momentum
  - (d) None of the above
5. The velocity of sound is maximum in
  - (a) Water

- (b) Air
- (c) Metal
- (d) None of the above

6. With the propagation of longitudinal waves through a medium, the quantity transmitted is

- (a) matter.
- (b) energy.
- (c) energy and matter.
- (d) energy, matter and momentum.

7. Sound waves of wavelength  $\lambda$  travelling in a medium with a speed of  $v$  m/ s enter into another medium where its speed is  $2v$  m/ s. Wavelength of sound waves in the second medium is

- (a)  $\lambda$
- (b)  $\lambda/2$
- (c)  $2\lambda$
- (d)  $4\lambda$

8. Which of the following statements are true for wave motion?

- (a) Mechanical transverse waves can propagate through all media.
- (b) Longitudinal waves can propagate through solids only.
- (c) Mechanical transverse waves can propagate through solids only.
- (d) Longitudinal waves can propagate through vacuum.

9. The open organ pipe (closed at one end) is excited to support the third harmonic. It is found that the air in the pipe has

- (a) two nodes and three antinodes
- (b) four nodes and three antinodes
- (c) three nodes and four antinodes
- (d) three nodes and three antinodes

**VERY SHORT ANSWER TYPE QUESTIONS [2 MARKS]**

10. Write the equation of a travelling wave in Positive direction.

11. Write the equation of a travelling wave in the negative direction.

12. What is the equation for a standing wave?

13. What do you mean by the fundamental frequency of vibrations?

### **SHORT ANSWER TYPE QUESTIONS [ 3 MARKS]**

14. Write any three characteristics of stationary waves.
15. What are transverse and longitudinal waves?
16. The equation of a plane progressive wave is,  $10 \sin 2\pi[t-0.005x]$  where  $y$  &  $x$  are in cm &  $t$  in seconds. Calculate the amplitude, frequency, wavelength & velocity of the wave.
17. Write the displacement equation respecting the following condition obtained in SHM.

$$\text{Amplitude} = 0.01\text{m} \text{ Frequency} = 600\text{Hz} , \text{ phase} = \phi = \frac{\pi}{6}$$

18. The equation of a progressive wave traveling on a stretched string is  $Y = 10\sin\left[\frac{t}{0.02} - \frac{x}{100}\right]$  where  $x$  and  $y$  are in cm, and  $t$  is in sec. What is the speed of the wave?

### **LONG ANSWER TYPE QUESTION [5 MARKS]**

19. What are standing waves? Show that in standing waves in a string,  $v_1 : v_2 : v_3 = 1:2:3$
20. Show that, the standing waves in a closed pipe is in the ratio,  $v_1 : v_2 : v_3 = 1:3:5$
21. Explain how you can produce transverse standing waves in a string.
22. Explain how you produce transverse standing waves in a string.

### **ANSWER KEY**

1	c
2	c
3	b
4	c
5	c
6	b
7	c
8	c
9	a
10	Refer notes
11	Refer notes
12	Refer notes
13	Refer notes
14	Ans. (i) in stationary waves, the disturbance does not advance forward. The conditions of crest and trough merely appear and disappear in fixed position to be followed by opposite condition after every half time period. (ii) The distance between two successive nodes or antinodes is equal to half the wavelength. (iii) The amplitude varies gradually from zero at the nodes to the

	maximum at the antinodes.
15	Refer notes
16	[i] Amplitude $A = -10\text{cm}$ [ii] frequency = $1\text{Hz}$ (iii) Wavelength = $200\text{cm}$ (iv) Velocity = $200\text{cm/s}$
17	$Y = 0.01 \sin[1200\omega t + \pi/6]$
18	$Y[x,t] = A \sin [2\pi/\lambda x - 2\pi/Tt + \phi] = A \sin 2\pi[x/\lambda - t/T] + \phi$ $Y[x,t] = -A \sin 2\pi[ t/T - x/\lambda] + \phi$ —[b] [a] & [b] gives, $A = -10 \text{ cm}$ , $\lambda = 100 \text{ cm}$ , $T = 0.02\text{s}$ , $f = 1/(T) = 50$ hertz $v = f\lambda = 50 \times 100 = 5000\text{cm/s} = 50 \text{ m/s}$
19	Refer notes
20	Refer notes
21	Refer notes
22	Refer notes

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