Unit test-11

11th Standard

Date : 06-Feb-19

Physics

Reg.No. : | | | | | | |

Time : 01:30:00 Hrs

Total Marks : 50

Part-I

10 x 1 = 10

Choose and write the correct answer.

1) For a particular tube, among six harmonic frequencies below 1000 Hz, only four harmonic frequencies are given: 300 Hz, 600 Hz, 750 Hz and 900 Hz. What are the two other frequencies missing from this list?.

(a) 100 Hz, 150 Hz (b) 150 Hz, 450 Hz (c) 450 Hz, 700 Hz (d) 700 Hz, 800 Hz

2) An air column in a pipe which is closed at one end, will be in resonance with the vibrating body of frequency 83Hz. Then the length of the air column is

(a) 1.5 m (b) 0.5 m (c) 1.0 m (d) 2.0 m

3) An organ pipe A closed at one end is allowed to vibrate in its first harmonic and another pipe B open at both ends is allowed to vibrate in its third harmonic. Both A and B are in resonance with a given tuning fork. The ratio of the length of A and B is

(a) $\frac{8}{3}$ (b) $\frac{3}{8}$ (c) $\frac{1}{6}$ (d) $\frac{1}{3}$

4) Which of the following statement are true for a stationary wave?

(a) Every particle has a forced amplitude which is different from the amplitude of its nearest particle

(b) All the particles cross their mean position at the same time (c) There is no transfer of energy across any plane

(d) All the above

5) Tube A has both ends open, while tube B has one and closed, otherwise they are' identical the ratio of fundamental frequency of tubes A & B is

(a) 1: 2 (b) 1: 4 (c) 2: 1 (d) 4: 1

6) When temperature increases, the frequency of a tuning fork

(a) increases (b) decreases (c) increases or decreases depending (d) remains the same

7) A sound absorber attenuates the sound level by 20dB the intensity decreases by a factor of

(a) 100 (b) 1000 (c) 10000 (d) 10

8) $Y_1 = 4 \sin(wt + kx)$, $Y_2 = -4 \cos(wt + kx)$, the phase difference is

(a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{2}$ (c) π (d) Zero

9) A wave equation is y = 0.01 sin ($100\pi t$ - kx) of wave velocity is l00m/s, its number is equal to

(a) 1 m^{-1} (b) 2 m^{-1} (c) πm^{-1} (d) $2\pi m^{-1}$

10) If an experment with sonometer, a tuning fork of frequency 256 Hz resonates with a length of 25cm and another tuning fork resonates with constants the frequency of the second tuning fork is

(a) 163.84 Hz (b) 400 Hz (c) 320 Hz (d) 204.8 Hz

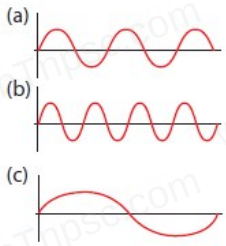
Part-II

4 x 2 = 8

Answer any 4 questions.

Q.No. is compulsory.

11) Three waves are shown in the figure below



Write down

(a) the frequency in ascending order

(b) the wavelength in ascending order

12) Compute the distance between anti-node and neighbouring node.

13) What are transverse waves?. Give one example.

14) What is meant by an echo?. Explain.

15) Define frequency and time period.

16) Explain why we cannot here an echo in a small room?

Part-II

4x 3 = 12

Answer any 4 questions.

Q.No. is compulsory.

17) Calculate the speed of sound in a steel rod whose Young's modulus Y = 2×10^{11} N m^{-2} and ρ = 7800 kg m^{-3}.

18) Two vibrating tuning forks produce waves whose equation is given by y1 = 5 sin(240πt) and y2 = 4 sin(244πt). Compute the number of beats per second.

19) If the third harmonics of a closed organ pipe is equal to the fundamental frequency of an open organ pipe, compute the length of the open organ pipe if the length of the closed organ pipe is 30 cm.

20) Write the characteristics of wave motion.

21) Define angular frequency, wave number and wave vector.

22) Derive the relation between Intensity and loudness

Part-IV

4x 5 = 20

Answer all the questions.

23) a) Write the expression for the velocity of longitudinal waves in an elastic medium.

(OR)

b) a) Let the source propagate a sound wave whose intensity at a point (initially) be I. Suppose we consider a case when the amplitude of the sound wave is doubled and the frequency is reduced to one-fourth. Calculate now the new intensity of sound at the same point ?.

b) A police in a siren car moving with a velocity 20 ms-1 chases a thief who is moving in a car with a velocity v0ms-1. The police car sounds at frequency 300Hz, and both of them move towards a stationary siren of frequency 400Hz. Calculate the speed in which thief is moving.

24) a) Show that the velocity of a travelling wave produced in a string is $v\sqrt{\frac{T}{\mu}}$

(OR)

b) Explain how overtones are produced in a

(a) Closed organ pipe

(b) Open organ pipe

25) a) Describe Newton's formula for velocity of sound waves in air and also discuss the Laplace's correction.

(OR)

b) a) Briefly explain the difference between travelling waves and standing waves.

b) Consider a mixture of 2 mol of helium and 4 mol of oxygen. Compute the speed of sound in this gas mixture at 300 K.

26) a) a) Discuss the law of transverse vibrations in stretched strings.

b) A ship in a sea sends SONAR waves straight down into the seawater from the bottom of the ship. The signal reflects from the deep bottom bed rock and returns to the ship after 3.5 s. After the ship moves to 100 km it sends another signal which returns back after 2s. Calculate the depth of the sea in each case and also compute the difference in height between two cases.

(OR)

b) a) Explain how the interference of waves is formed.

All the best
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