PHYSICS

BOOKS - MODERN PUBLICATION PHYSICS (KANNADA ENGLISH)

WAVE MOTION

Multiple Choice Questions Level I

1. A progressive sound wave of frequency 500 Hz is travelling through air with speed 350

m/s. A compression maxima appears at a place at a given instant. The minimum time interval after which the rerefaction maxima occurs at the same point is :

A. 250 s

B. $\frac{1}{250}$ s

C. $\frac{1}{500}$ s

D. $\frac{1}{1000}$ s .

Answer: D

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2. The temp. at which the speed of sound in air becomes double its value at 0° C is :

A. 273° C

B. 546° C

C. 819° C

D. 1092° C

Answer: C

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3. The velocity of sound in air at 9 atmosphere pressure and that at 1 atm. Pressure would be

A. $1:1$

B. $9:1$

C. $1:9$

D. $3:1$

Answer: A

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4. The velocity of sound in diatomic gas is 300 m/s, the root mean square velocity of molecules is of order of :

A. 440 m/s

B. 40 m/s

C. 4000 m/s

D. 4 m/s .

Answer: A

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5. An echo repeats two syllables. If the velocity of sound is 330 m/s. then the distance of reflecting surface is :

A. 16.5 m

B. 33.0 m

C. 66 m

D. 99 m

Answer: C

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6. A man standing symertrically between parallel cliffs, claps his hands and hearing a series of echoes at intervals of s if speed of sound in air is 340 m/s then the distance between two parallel cliffs is :

A. 340 m

B. 510 m

C. 680 m

D. 270 m .

Answer: A

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7. The minimum intensity of audibility of sound is 10^{-12} watt/m^2 intensity of sound is 10^{-9} watt/m^2 the intensity level of this sound in decibels is :

A. 1000

B. 100

C. 30

D. 300

Answer: C

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8. The intensity of a sound gets reduced by 20% on passing through two consecutive slabs is :

A. 0.4

B. 0.36

C. 0.3

D. 0.6

Answer: B

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9. If the pressure amplitude in a sound wave is tripled then the intensity of sounds is increased by :

A. 9

B. 3

C. 6

D. $\sqrt{3}$.

Answer: A

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10. A boat at anchor is rocked by waves whse crests are 100 cm aprt and whose velocity is 25 cm/s. these waves reach the boat once every :

A. 0.25 s

B. 4 s

C. 25 s

D. 15 s

Answer: B

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11. The minimum distance of the reflector from the listener to hear the echo of monosyllabe sound is nearly equal to :

A. 16.5 m

B. 33 m

C. 66 m

D. 330 m

Answer: B

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12. The young's modulus of steel is 20×10^{10} N/m^2 . If the density of steel is 7.7×10^3 kg/m^2, the velocity of longitudinal wave in steel is nearly :

A. 50 m/s.

B. 500 m/s

C. 5000 m/s

D. 50,000 m/s.

Answer: C

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13. The velocity of sound in gas is 206 m/s. at N.T.P. The increase in velocity per $^{\circ}$C rise in temp. in this gas is :

A. 0.61 m/s K^{-1}

B. 0.38 m/s K^{-1}

C. 0.82 m/s k^{-1}

D. 1.26 m/s K^{-1} .

Answer: B

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14. The equation of a plane Progressive wave is Y = 1.5 sin (314t - 12.56 x) metres. Then amaximum particle velocity is :

A. 25 m/s

B. 471 m/s

C. 314 m/s

D. None of these

Answer: B

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15. In above question the wavelength of wave is :

A. 0.5 m

B. 1.5 m

C. 2.5 m

D. 12.56 m

Answer: A

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16. In Q No. 27 the frequency of wave is :

A. 150 Hz

B. 50 Hz

C. 30 Hz

D. 10 Hz.

Answer: B

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17. A sound wave has frequency 500 Hz and velocity 350 m/s . What is the distance between the two particles having phase diff. of 60° .

A. 0.7 cm

B. 11.6 cm

C. 70 cm

D. 120 cm .

Answer: B

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18. Velocity of sound in air is 300 m/s. Then the distance between two successive nodes of a stationary wave of frequency 1000 Hz is :

A. 10 cm

B. 20 cm

C. 15 cm

D. 30 cm

Answer: C

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19. A fork of unkown frequency when sounded with another fork of frequency 256 produces 4 beats/s. he first fork is loaded with wax. It

again produces 4 beats/s. when sounded together with fork of 256 Hz frequency then the frequency of first tunning fork is :

A. 260 Hz

B. 252 Hz

C. 252 or 260 Hz

D. None of these

Answer: A

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20. Two tunning forks of frequencies 250 and 256 Hz produce beats. If a maxima is produced just now after how much time the minima is produced at the same place :

A. $\frac{1}{18}$ s

B. $\frac{1}{24}$ s

C. $\frac{1}{6}$ s

D. $\frac{1}{12}$ s.

Answer: D

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21. 56 tunning forks are arranged in a series that each fork given 4 beats/s with previous one. The frequency of last fork is 3 times that fo first. Then frequency of first fork is :

A. 52 Hz

B. 56 Hz

C. 60 Hz

D. 110 Hz

Answer: D

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22. The fundamental frequency of an open pipe is N Keeping the pipe vertical, it is submerged in water such that half of it is immersed in water, so fundamental frequency of air column is :

A. N

B. N/2

C. 2N

D. 3 N/4 .

Answer: A

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23. When a wave undergoes reflection at rarer medium then it undergoes a phase difference of :

A. π

B. $\pi/2$

C. 2π

D. No change is plase.

Answer: D

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24. The frequency of the third harmonic of a closed organ pipe is equal to which of overtones:

A. first

B. second

C. third

D. none of above .

Answer: A

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25. A streched string fixed at both ends has n nodes then the length of string in terms of wavelength is :

A. $n\frac{\lambda}{2}$

B. $(n+1)\frac{\lambda}{2}$

C. $(n-1)\frac{\lambda}{2}$

D. $\left(n+\frac{1}{2}\right)\frac{\lambda}{2}$

Answer: C

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26. The distance between two points differeing in phase by 60° on a wave having velocity 360m/s and frequency 500Hz is

A. 0.72 m

B. 0.18 m

C. 0.12 m

D. 0.36 m

Answer: C

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27. A transverse wve given by Y = 0.021 sin (x + 30t) is propagating in a string of linear density

1.3 x, 10^{-4} kg/m. If x and y are in metres and time in seconds , the tension in string is :

A. 2.4 N

B. 1.2 N

C. 0.12 N

D. 240 N

Answer: C

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28. A wave is given by the equation Y = 10^{-4} sin (60t + 2x) where x and y are in metres and t in second, then wavelength of the wave is :

A. π metre

B. 2π metre

C. $\frac{3\pi}{2}$ metre

D. 3π metre

Answer: A

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29. A string when stretched with a weight of 9 kg weigth produces a note of frequency 256. Calculate the weight to produces an octave of the note.

A. 36 kg wt

B. 9/4 kg wt

C. 18 kg wt

D. 4 kg wt.

Answer: A

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30. When sound travels from air to water the quantity that remains unchanged is :

A. speed

B. frequency

C. intensity

D. wavelength

Answer: C

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31. Stationary waves of frequency 200 are formed in air. If velovity of the wave is 360 m/s the shortest distance between antinodes will be :

A. 1.8 m

B. 3.6 m

C. 2.7 m

D. 0.9 m

Answer: D

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32. A string of 0.3 m length is found to resonate in 3 segments (nodes at both ends) when the driving frequency is 20 Hz. The speed of the wave in the spring is :

A. 3 m/s

B. 4 m/s

C. 5 m/s

D. 9 m/s

Answer: B

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33. An engine standing at the platform blows a whistle of frequency 305 vib/sec. if the velocity of sound be 1220 km/h, the frequency of the whistle as heard by a man towards the engine with a speed of 20 km/h is :

A. 300 vib/s

B. 305 vib/s

C. 310 vib/s

D. 320 vib/s

Answer: C

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34. The wavelength of light coming from a star shifts towards the violet end of the spectrum .

A. receding from the earth

B. approaching the earth

C. neither approaching nor receding from the earth

D. sometimes aproaching and sometimes receding from the earth .

Answer: B

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35. A star emitting light of 5000 Å is receding away from earth with a velocity of 300 km/s. the apparent wavelength of light is :

A. 5000Å

B. 5005 Å

C. 5050 Å

D. 4096 Å

Answer: B

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36. The air column in a pipe which is closed at one end will be in resonance with a vibrating

tuning fork at a frequency 250 Hz. If the length of the air column is :

A. 33 cm

B. 62. cm

C. 45 cm

D. 12.5 cm .

Answer: A

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37. At what speed should a source of sound moves so that observer find that apparent frequency equal to half of the original frequecy ?

A. $\frac{v}{2}$

B. 2v

C. $\frac{v}{4}$

D. v

Answer: D

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38. If the amplitude of sound is doubled and the frequency reduced to one-fourth, the intensity of sound at the same point will be :

A. increasing by a factor of 2

B. decreasing by a factor of 2

C. decreasing by a factor 4

D. unchanged .

Answer: C

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39. A wave is represented by the equation

$y = 7 \sin\left(7\pi t - 0.04\pi x + \frac{\pi}{3}\right)$

where x is in metre and t is in second. The speed of the wave is :

A. 175 m/s

B. 49 m/s

C. $49/\pi$m/s

D. 0.28 π m/s

Answer: A

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40. What is frequency of radio waves transmitted by a station , if the wavelength of these waves is 300 m ?

A. 1 MHz

B. 10 Hz

C. 1 GHz

D. 100000 Hz.

Answer: A

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41. A transverse wave is represented by the equation y = $y_0 \frac{2\pi}{\lambda}$ sin (vt - x). For what value of λ is the particle velocity equal to two times the wave velocity ?

A. $\lambda = 2\pi y_0$

B. $\lambda = 2\pi y_0 /3$

C. $\lambda = 2\pi y_0 /2$

D. $\lambda = 2\pi y_0$.

Answer: D

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42. In a sinusoidal wave, the time required for a particular point to move from maximum displacement to zero displacement is 0.170 s. the frequency of the wave is :

A. 1.47 Hz

B. 0.36 Hz

C. 0.73 Hz

D. 2.94 Hz

Answer: A

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43. the wavelengths of two waves are 50 and 51 cm respectively. If the temperature of the room is 20° C, then what will be the number

of beats produced per second by these waves, when the speed of sound at 0° C is 332 m/s ?

A. 14

B. 10

C. 24

D. none of these

Answer: A

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44. A transverse wave is represented by the equation y = $y_0 \frac{2\pi}{\lambda}$ sin (vt - x). For what value of λ is the particle velocity equal to two times the wave velocity ?

A. $\lambda = y_0 /2$

B. $\lambda = 2y_0$

C. $\lambda = \frac{2\pi y_0}{2}$

D. $\lambda = y_0/4$.

Answer: C

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45. The phase difference between two waves represented by

$$y_1 = 10^{-6}\sin\left[100t + \frac{x}{50} + 0.5\right] \text{ m}$$

$$y_2 = 10^{-6}co\left[100t + \frac{x}{50}\right] \text{m}$$

Where x is in metre and t in seconds, is :

A. 0.5 radian

B. 1.07 radian

C. 1.5 radian

D. 2.07 radian.

Answer: B

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46. The time of reverberation of a room a is one seond. What will be the time of reverberation of room having all the dimensions double of those of room A :

A. 1 s

B. 2 s

C. 4 s

D. 1/2 s

Answer: B

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47. Two monoatomic ideal gases 1 and 2 of molecular masses m_1 and m_2 respectively are enclosed in separate containers ketp at the same temperature. The ratio of the speed of sound in gas 1 t that in gas 2 is :

A. $\sqrt{\frac{m_1}{m_2}}$

B. $\frac{m_1}{m_2}$

C. $\sqrt{\frac{m_2}{m_1}}$

D. $\frac{m_2}{m_1}$

Answer: C

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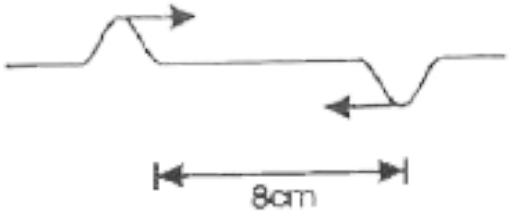
48. Twp pulses in a stretched string whose centers are initially 8 cm aprt moving towards each other as shown in fig. The speed of each pulse is 2 cm /s. After 2 seconds, the total

energy of the pulses will be :



A. zero

B. purely potential

C. purely kinetic

D. partly kinetic x partly potenial .

Answer: C

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49. A stationary sound wave has frequency 165 Hz (speed of sound in air = 330 m/s), then distance between two consecutive nodes is :

A. 2 m

B. 0.5 m

C. 1 m

D. 4 m

Answer: C

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50. A wave y a sin $(\omega t - kx)$ on a string meets with another wave producing a node at x = 0 . Then the equation of the unknown wave is :

A. y = a sin $(\omega t + kx)$

B. y = a sin $(\omega t - kx)$

C. y = - a sin $(\omega t + kx)$

D. y = - a sin $(\omega t - kx)$

Answer: C

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51. A tuning fork produces 4 beats/sec. with another fork of frequency 288 cps. A little wax is placed on the unknown fork and it then produces 2 beats/sec. the unknown frequency is :

A. 286 cps

B. 284 cps

C. 292 cps

D. 290 cps

Answer: C

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52. Tube A has both ends open, while tube B has one end closed, otherwise they are identical. The ratio of fundamental frequency of tube A and B is :

A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer: B

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53. A source of sound of frequency 600 Hz is placed inside water. The speed of sound in water is 1500 m/s, and in air it is 300 m/s. the frequency of sound recorded by an observer who is standing in air is :

A. 200 Hz

B. 120 Hz

C. 3000 Hz

D. 600 Hz

Answer: D

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54. When two tuning forks (fork 1 and fork 2) are sounded simultaneously, 4 beats second are heard. Now some tape is attached on the prong of the fork 2. When the tuning forks are sounded again, 6 beats per second are heard.

If the frequency of fork 1 is 200 Hz, then what was the original frequency of fork 2 ?

A. 204 Hz

B. 196 Hz

C. 202 Hz

D. 200 Hz

Answer: B

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55. A whistle producting sound waves of frequencies 9500 Hz and above is approaching a stationary person with v ms^{-1}. The velocity of sound in air is 300 ms^{-1} . If a person can hear frequencies upto 10,000 Hz, the maximum value of v upto which he can hear the whistle is :

A. $15\sqrt{2}ms^{-1}$

B. $\frac{15}{\sqrt{2}}ms^{-1}$

C. $15ms^{-1}$

D. $30ms^{-1}$

Answer: C

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56. In the experiment to determine the speed of sound using a resonace column,

A. prongs of the tuning fork are kept in a vertical plane.

B. prongs of the tuning fork are kept in a horizontal plane .

C. in one of the two resonances observed, the length of the resonating air column is close to the wavelength of sound in air

D. in one of the two resonances observed, the length of the resonating air column is close to half of the wavelength of sound in air.

Answer: A

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57. The equation of wave on a string of linear mass density 0.04 kg m^{-1} is given by

$y = 0.02\ (m) \sin\left[2\pi\left(\frac{t}{0.04(s)} - \frac{x}{0.50(m)}\right)\right]$

The tension in the string is :

A. 6.25 N

B. 4.0 N

C. 12.5 N

D. 0.5 N

Answer: A

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58. When two progressive waves y_1 = 4 sin (2x - 6t) and $y_2 = 3\sin\left(2x - 6t - \frac{\pi}{2}\right)$ are superimposed, the amplitude of the resultant wave is ..... .

A. 5 m

B. 10 m

C. 20 m

D. 40 m

Answer: B

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59. A transverse wave is represented by the equation y = $y_0 \frac{2\pi}{\lambda}$ sin (vt - x). For what value of λ is the particle velocity equal to two times the wave velocity ?

A. $\lambda = \pi y_0$

B. $\lambda = \pi y_0 l^2$

C. $\lambda = x y_0 l^3$

D. $\lambda = 2\pi y_0.$

Answer: A

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60. A stone is dropped into a lake from a tower 500 metre high. The sound of the splash will be heard by the man approximately after :

A. 10 seconds

B. 14 seconds

C. 21 seconds

D. 11.5 seconds.

Answer: D

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61. The equation of a plane progressive is given by $y = 0.025 \sin (100\ t + 0.25\ x)$. The frequency of this wave would be :

A. 50 Hz

B. 100 Hz

C. $\frac{50}{\pi}$ Hz.

D. None of these.

Answer: C

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62. The equation of travelling wave is y = 60 cos (1800 t - 6x) , where y is in microns, t in seconds and x in metres. The ratio of

maximum particle velocity to velocity of wave propagation is :

A. 3.6

B. 3.6×10^{-6}

C. $\left(3.6 \times 10^{-11}\right)$

D. 3.6×10^{-4}.

Answer: D

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63. The tension in a piano wire is 10 N. What should be the tension in the wire to produces a note of double the frequency ?

A. 5 N

B. 20 N

C. 40 N

D. 80 N

Answer: C

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64. Two sound waves having a phase difference of 60° have path difference of :

A. 2λ

B. $\lambda/2$

C. $\lambda/3$

D. $\lambda/6$

Answer: D

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65. A siren emitting sound of frequency 800 Hz is going away from a static listener with a speed of 30 m/s. The frequency of sound heard by listener is (velocity of sound = 300 m/s) :

A. 727.3 Hz

B. 481.2 Hz

C. 644.8 Hz

D. 286.5 Hz.

Answer: A

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66. The velocities of sound at the same temperature in two monoatomic gases of densities ρ_2 and ρ_2 are v_1 and v_2 respectively. If $\rho_2 / \rho_2 = 4$, then value of v_1 / v_2 is :

A. 1/4

B. 1/2

C. 2

D. 4

Answer: C

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67. In a stationary waves are variation in pressure at nodes is :

A. twice that due to one wave

B. thrice that due to one wave

C. zero

D. maximum.

Answer: D

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68. A whistle revolves in a circle with angular speed ω = 20 rad/sec using a string of length 50 cm . If the frequency of sound from the whistle is 385 Hz, what is the minimum frequency heard by an observer which is far away from the centre. Velocity of sound in air is 340 m/s

A. 385 Hz

B. 394 Hz

C. 374 Hz

D. 333 Hz

Answer: C

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69. The equation of wave travelling in a string can be written as $y = 3 \cos \pi (100 t - x)$. Its wavelength is :

A. 2 cm

B. 5 cm

C. 100 cm

D. None

Answer: A

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70. Quality of sound depends upon :

A. frequency

B. overtones

C. amplitude

D. none of these

Answer: B

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71. If foundamental frequency of closed pipe is 50 Hz, then frequency of second overtione is :

A. 100 Hz

B. 250 Hz

C. 50 Hz

D. 150 hz

Answer: B

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72. The waves produced by a motorboat , sailing in water, are :

A. stationary

B. longitudinal

C. transverse

D. both (b) and (c)

Answer: D

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73. When tuning fork is vibrating the vibration of two tuning prongs :

A. differ in phase by $\pi/4$

B. differ in phase by π

C. are in same phase

D. differ in phase $\frac{\pi}{2}$

Answer: B

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74. A source of sound S is moving with a velocity 50 m/s towards a stationary observer. The observer measures the frequency of the source as 1000 Hz. What will be the apparent

frequency of the source when it is moving away from the observer after crossing him : the velocity of soudn in the medium is 350 m/s .

A. 1333 Hz

B. 1143 Hz

C. 857 Hz

D. 750 Hz

Answer: D

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Multiple Choice Questions Level Ii

1. A stone is dropped into a well and sound of impact of stone with water is heard after 2.056 second of the release of stone from top If g 980 cm/s^2 and velocity of sound is 350 m/s. Then depth of well is :

A. 19.6 m

B. 9.8 m

C. 30 m

D. 7 m

Answer: A

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2. A road runs between two parallel rows of buildings. A motorist moving with speed of 36 km/h sounds the horn. He hears the echo one second after he sounds the horn. He hears the echo one second after he sounded the horn. If

speed of sound is 330 m/s then distance between two rows of buildings is :

A. 330 m

B. $2\sqrt{(165)^2-(5)^2}$ m

C. 165 m

D. $\sqrt{(165)^2-(5)^2}$ m

Answer: B

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3. There are three source of sound of equal intensities with frequencies 400, 401 and 402 Hz. The no. of beats per second is :

A. 0

B. 1

C. 2

D. 3

Answer: B

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4. The velocity of sound in gas in which two waves of wavelength 1.0 m and 1.01 m produces 4 beats/s is :

A. 360 m/s

B. 404 m/s

C. 1010 m/s

D. 440 m/s

Answer: B

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5. A tunning fork produces 4 beats/s both with 50 and 40 cm of a stretched wire of sonometer. The frequency of fork is :

A. 36 Hz

B. 50 Hz

C. 90 Hz

D. 110 Hz

Answer: A

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6. A tunning fork of frequency 500 Hz is sounded on a resonance tube. The first & second resonances are obtained at 17 cm and 52 cm. The velocity of sound in m/s :

A. 170

B. 350

C. 520

D. 850

Answer: B

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7. A whistling engine is approaching a stationary observer with velocity 110 m/s. The velocity of sound is 330 m/s. The ratio of frequencies as heard by observer at the time of approaching and passing of engine is :

A. $4:3$

B. $3:6$

C. $4:1$

D. $2:1$

Answer: D

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8. The spectral line for a given element in light received from a distance star is shifted towards longer wavelength by 0.32 % . What is velocity of star if C = 3×10^8 m/s

A. 9.6×10^4 m/s

B. 9.6×10^2 m/s

C. 9.6×10^3 m/s

D. 9.6×10^5 m/s.

Answer: D

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9. Two sources of intensities ratio 25 : 1 interfere. The ratio of intensities at maxima and minima will be :

A. $9:4$

B. $1:5$

C. $2:1$

D. $5:1$

Answer: A

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10. A fork gives 5 beats with a 40 cm length of sonometre wire. If the length of the wire is shortened by 1 cm, the number of beats is still the same. The frequency of the fork is :

A. 385 Hz

B. 600 Hz

C. 395 Hz

D. 400 Hz

Answer: C

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11. A certain string will resonate to several frequencies, the lowest of which is 200 Hz.

What are the next three higher frequency to which it resonates ?

A. 400, 600, 800

B. 100, 200, 300

C. 50, 150 ,300

D. 200, 250, 300

Answer: A

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12. A man is watching two trains one leaving and other approaching with equal velocities of 4 ms^{-1}. If they sound their whistles each of natural frequency 240 hz, the number of beats heard per seceond by the mas will be (velocity of sound in air 320 ms^{-1}) :

A. 6

B. 12

C. 4

D. None of these.

Answer: A

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13. A motor cyclist moving with 30 km/ h blows a whistle of 476 Hz towards a cliff. If velocity of sound is 1220 Km/h, the apparent frequency of the echo heard by him is :

A. 250 Hz

B. 500 Hz

C. 425 Hz

D. 476 Hz.

Answer: B

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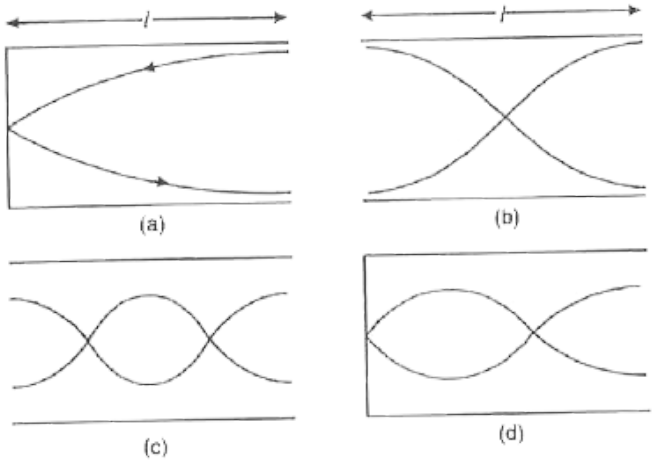
14. The vibrations of 4 air columns are as shown in the fig. the ratio of the frequencies A,

B , C , D is :



A. $12:6:3:4$

B. $1:2:4:3$

C. $4:2:3:1$

D. $6:2:3:4$

Answer: B

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15. A wave of frequency 100 Hz travels along a string towards its fixed end. When this wave travels back, after reflection, a node is formed at a distance 10 cm from the fixed end. The speed of the wave (reflected and incedent) is :

A. 5 m^{-1}

B. 20 m^{-1}

C. 100 ms^{-1}

D. 40 ms^{-1}

Answer: B

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16. A column of air and a tuning fork give 4 beats per second the fork giving lower frequency note at 15° C. When the temperature falls to 10° C the number of beats per second is reduced by one. What is the frequency of fork ?

A. 256 Hz

B. 220 Hz

C. 110 Hz

D. 440 Hz.

Answer: C

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17. An unknown frequency x produces 8 beats per second with a frequency of 250 Hz 12 betas with 270 Hz source, then x is :

A. 258 hz

B. 242 hz

C. 262 Hz

D. none of these

Answer: A

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18. If an open organ pipe is sounded with a tuning fork having frequency 256 Hz

resonance occurred at 35 cm and 105 cm the velocity of sound is :

A. 360 m/s

B. 512 m/s

C. 524 m/s

D. all of these

Answer: A

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19. A toothed wheel is rotated at 120 r.p.m and a post-card is placed aginest the teeth. How many teeth (frequency) must the wheel have to produce a note whse pitch is same as that of a tunning fork of frequency 256/ second ?

A. 256

B. 120

C. 64

D. 32

Answer: D

Watch Video Solution

20. A source of sound gives five beats per second, when sounded with another source of frequency $100s^{-1}$. The second harmonic of the source, together with a source of frequency $205s^{-1}$ gives five beats per second. What is the frequency of the source ?

A. $105s^{-1}$

B. 205 s^{-1}

C. 95 s^{-1}

D. 100 s^{-1} .

Answer: A::C

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21. Two whistles A & B produces notes of frequencies 660 Hz and 596 Hz respectively. There is a listener at the middle point of the line joining them. Both the whistles B and the listener start moving with speed 30 m/s away from the whistle A. If speed of sound be 330

m/s, how many beats will be heard by the listener ?

A. 2

B. 4

C. 6

D. 8

Answer: B

Watch Video Solution

22. A string oscilating at foudamental frequency under a tension of 225 N produces 6 beats per second with a sonometer . If the tension is 256 N then again oscillating at fundamental note it produces beats per second with the same sonometer. What is the frequency of the sonometer ?

A. 256

B. 225

C. 280

D. 186

Answer: D

Watch Video Solution

23. Two sirens situated one kilometer apart are producing sound of frequency 330 Hz. An observer starts moving from one siren to the other with a speed of 2 m/s. if the speed of sound be 330 m/s. What will be the beat frequency heard by the observer ?

A. 8

B. 4

C. 6

D. 1

Answer: B

 Watch Video Solution

24. Standing waves are produced in a 10 m long stretched string. If the string vibrates in 5

segments and the wave velocity is 20 m/s, the frequency is :

A. 2 Hz

B. 4 Hz

C. 5 Hz

D. 10 Hz

Answer: C

Watch Video Solution

25. The apparent frequency of a note is 200 Hz. When a listener is moving with a velocity of 40 ms^{-1} towards a stationary source. When he moves away from the same source with the same speed, the apparent frequency of the same note is 160 Hz. The velocity of sound in air in m//s is

A. 360

B. 330

C. 320

D. 340

Answer: A

Watch Video Solution

26. A pipe open at both ends produces a note of frequency f_1. When the pipe is kept with $\frac{3}{4}$ th of its length in water, it produces a note of frequency f_2 The ratio $\frac{f_1}{f_2}$ is :

A. $\frac{3}{4}$

B. $\frac{4}{3}$

C. $\frac{1}{2}$

D. 2

Answer: C

Watch Video Solution

27. A wire is made by welding two wires (radius r and 2r) at one of its end. On using this combined wire in the sonometer , under tension T the welding point is just in middle of

the bridges. On vibrating stationary waves are produced. If welding points is a node then the ratio

A. $2:3$

B. $2:5$

C. $3:2$

D. $1:2$

Answer: D

View Text Solution

28. A car sounding its horn at 480 Hz moves towards a high wall at a speed of $20ms^{-1}$. If the speed of sound is $340ms^{-1}$, the frequency of the reflected sound heard by the passenger sitting in the car will be nearest to

A. 480 Hz

B. 540 Hz

C. 510 Hz

D. 570 Hz

Answer: B

Watch Video Solution

29. Statement -I : Sound waves cannot propagate through vecuum but ligth can .

Satement -II : Sound waves cannot be polarised but light can be polarised.

A. Statement -I is true, Statement -II is true and

Statement -I is correct explanation for Statement -II.

B. Statement-I is true, Statement-II is true and Statement -II is not correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false and

D. Statement-I is false, Statement-II is false.

Answer: B

 Watch Video Solution

30. Statement -I : When we statrt filling the empty bucket with water, then the pitch of sound waves produced keeps on decreasing

Statement-II : The frequency of boy's voice is usually greater than that of girls's voice.

A. Statement -I is true, Statement -II is true and

Statement -I is correct explanation for Statement -II.

B. Statement-I is true, Statement-II is true and Statement -II is not correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false and

D. Statement-I is false, Statement-II is false.

Answer: D

 Watch Video Solution

31. Statement-I : The velocity of sound in a medium increases with the presence of moisture.

Statement -II : Velocity of sound does not depend upon the nature of medium .

A. Statement -I is true, Statement -II is true and

Statement -I is correct explanation for Statement -II.

B. Statement-I is true, Statement-II is true and Statement -II is not correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false and

D. Statement-I is false, Statement-II is false.

Answer: C

 Watch Video Solution

32. Statement-I : sound waves of frequency less than 20Hz is not audiable to human beings.

Statement-II : infra sonic waves are produced during earthquakes.

A. Statement -I is true, Statement -II is true and

Statement -I is correct explanation for Statement -II.

B. Statement-I is true, Statement-II is true and Statement -II is not correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false and

D. Statement-I is false, Statement-II is false.

Answer: B

 Watch Video Solution

33. Statement -I : During thunderstoms light is seen much eartear than the hearing of sound.

Statement-II : Speed of light is much more thant speed of sound .

A. Statement -I is true, Statement -II is true and

Statement -I is correct explanation for Statement -II.

B. Statement-I is true, Statement-II is true and

Statement -II is not correct explanation of Statement-I.

C. Statement-I is true, Statement-II is false and

D. Statement-I is false, Statement-II is false.

Answer: A

 Watch Video Solution

34. Read the following paragraph and answer the following questions :

In a reaonance tube apparatus a tunning fork of unknown frequency after striking with a rubber pad is held near the open end of resonance tube. The airm column of resonance tube can be varied. For definite length of air column is resonance tube. the airm column of resonance tube can be varied. For definite length of air column in resonance tube, standing waves are set up due to superposition of sound arives travelling in

opposite directions. the smallest value of length of air column which intensity of sound is maximum is 10 cm. Take speed of sound 344 m/s.

The frequency of tunning fork used in the above experiment is :

A. 533 Hz

B. 860 Hz

C. 960 Hz

D. 1090 Hz.

Answer: B

Watch Video Solution

35. Read the following paragraph and answer the following questions :

In a reaonance tube apparatus a tunning fork of unknown frequency after striking with a rubber pad is held near the open end of resonance tube. The airm column of resonance tube can be varied. For definite length of air column is resonance tube. the airm column of resonance tube can be varied. For definite length of air column in resonance tube,

standing waves are set up due to superposition of sound arives travelling in opposite directions. the smallest value of length of air column which intensity of sound is maximum is 10 cm. Take speed of sound 344 m/s.

The frequency of second overtone is :

A. 2580 Hz

B. 1720 Hz

C. 4300 Hz

D. 3420 Hz.

Answer: C

Watch Video Solution

36. Read the following paragraph and answer the following questions :

In a reaonance tube apparatus a tunning fork of unknown frequency after striking with a rubber pad is held near the open end of resonance tube. The airm column of resonance tube can be varied. For definite length of air column is resonance tube. the airm column of

resonance tube can be varied. For definite length of air column in resonance tube, standing waves are set up due to superposition of sound arives travelling in opposite directions. the smallest value of length of air column which intensity of sound is maximum is 10 cm. Take speed of sound 344 m/s.

Find the number of times, intensity is maximum in time interval of 1 sec.

A. 4

B. 6

C. 8

D. 0

Answer: A

View Text Solution

37. Read the following paragraph and answer the following questions :

In a reaonance tube apparatus a tunning fork of unknown frequency after striking with a rubber pad is held near the open end of

resonance tube. The airm column of resonance tube can be varied. For definite length of air column is resonance tube. the airm column of resonance tube can be varied. For definite length of air column in resonance tube, standing waves are set up due to superposition of sound arives travelling in opposite directions. the smallest value of length of air column which intensity of sound is maximum is 10 cm. Take speed of sound 344 m/s.

Find wave velocity of sound :

A. 100 m/s

B. 192 m/s

C. 200 m/s

D. 96 m/s

Answer: C

View Text Solution

38. Read the following paragraph and answer the following questions :

In a reaonance tube apparatus a tunning fork

of unknown frequency after striking with a rubber pad is held near the open end of resonance tube. The airm column of resonance tube can be varied. For definite length of air column is resonance tube. the airm column of resonance tube can be varied. For definite length of air column in resonance tube, standing waves are set up due to superposition of sound arives travelling in opposite directions. the smallest value of length of air column which intensity of sound is maximum is 10 cm. Take speed of sound 344 m/s.

Find the number of times $y_1 + y_2 = 0$ at x = 0 in 1 sec.

A. 100

B. 46

C. 192

D. 95

Answer: D

View Text Solution

39. An aluminium rod of length 90 cm is clamped at its midpoint and is set into longitudinal vibrations by stroking it with resined cloth. Assume that the rod vibrates in its fundamental mode of vibration . The density of aluminium is 2600 kg/m^3 and its Young's modulus is $7.80 \times 10^{10} N/m^2$. speed of sound in air is 340 m/s.

The speed of sound in aluminium is :

A. 548 m/s

B. 5480 m/s

C. 54.5 m/s

D. 5.48 m/s

Answer: B

Watch Video Solution

40. An aluminium rod of length 90 cm is clamped at its midpoint and is set into longitudinal vibrations by stroking it with resined cloth. Assume that the rod vibrates in its fundamental mode of vibration . The

density of aluminium is 2600 kg/m^3 and its Young's modulus is $7.80 \times 10^{10} N/m^2$. speed of sound in air is 340 m/s.

The wavelength of sound produced in the rod is :

A. 80 cm

B. 120 cm

C. 100 cm

D. 180 cm

Answer: D

Watch Video Solution

41. An aluminium rod of length 90 cm is clamped at its midpoint and is set into longitudinal vibrations by stroking it with resined cloth. Assume that the rod vibrates in its fundamental mode of vibration . The density of aluminium is 2600 kg/m^3 and its Young's modulus is $7.80 \times 10^{10} N/m^2$. speed of sound in air is 340 m/s.

the frequency of the sound produced in air is :

A. 3050 Hz

B. 305 Hz

C. 30.5 Hz

D. 3.05 Hz

Answer: A

Watch Video Solution

42. An aluminium rod of length 90 cm is clamped at its midpoint and is set into longitudinal vibrations by stroking it with resined cloth. Assume that the rod vibrates in

its fundamental mode of vibration . The density of aluminium is 2600 kg/m^3 and its Young's modulus is $7.80 \times 10^{10} N/m^2$. speed of sound in air is 340 m/s.

The wavelength of sound produced in air is :

A. 11.1 cm

B. 111 cm

C. 1.11 cm

D. 0.111 cm

Answer: A

Watch Video Solution

43. A siren placed at a railwary platform is emitting sound of frequency 5 k Hz. A passenger sitting in a moving train approaches the siren. During his return journey in a different train B, he records a frequency of 6.0 K Hz. While approaching the same siren. The ratio of velocity of train B to the velocity of train A is :

A. 242/252

B. 43957

C. 2

D. 44141

Answer: C

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44. A tuning fork of known frequency 256 Hz makes 5 beats per second with the vibrating string of a piano . The beat frequency decreases to 2 beats/s when the tension in the

piano string is slightly increased. The frequency of the piano string before increasing the tension was :

A. (256 + 2) Hz

B. (256 - 5) Hz

C. (256 - 2) Hz

D. (256 + 5) Hz

Answer: B

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45. A mctal wire of linear mass density 9.8 /m is stretched with a tension of 10 kg wt between two rigid supports 1 metre apart. The wire passes at its middle point between the poles of a permanent magnet and it vibreates in resonance when carrying an alternating current of frequency n. the frequency n of alternating source is :

A. 50 Hz

B. 200 Hz

C. 100 hz

D. 25 Hz

Answer: A

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46. the displacement y of a particle in a medium can be expressed as

$y = 10^{-6} \sin\left(100t + 20x + \frac{\pi}{4}\right)$ m where t is in seconds and x in metre

The speed of wave is :

A. 2000 m/s

B. 50 m/s

C. 20 m/s

D. 5 m/s

Answer: D

Watch Video Solution

47. An observer moves towards a stationary source of sound with a velocity one-fifth of the velocity of sound. What is the percentage increase in the apparent frequency ?

A. 0.2

B. 0.05

C. 0.005

D. zero

Answer: A

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48. Paragraph : A particle vibrates in S.H.M. along a straight line. Its velocity is 4 cm/s when its displacement is 3 cm and velocity is 3

cm/s when displacement is 4 cm.

Two simple harmonic motions are represented by the equations $y_1 = 0.1\sin(100\pi t + \pi/3)$ and y = 0.1 $\cos \pi t$. The phase difference of the velocity of particle 1 with respect to the velocity of particle 2 is :

A. $\frac{\pi}{6}$

B. $\frac{-\pi}{3}$

C. $\frac{\pi}{3}$

D. $\frac{-\pi}{6}$

Answer: D

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49. A string is stretched between fixed points separated by 75 cm. It is observed to have a resonant frequencies of 420 Hz and 315 Hz. There are no other resonant frequences between these two. Then the lowest resonant frequency for this string is :

A. 105 Hz

B. 1.05 Hz

C. 1050 Hz

D. 10.5 Hz

Answer: A

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50. A sound absorber attenuates the sound level by 20 dB. The intensity decreases by a factor of :

A. 10000

B. 10

C. 100

D. 1000

Answer: C

Watch Video Solution

51. A wave travelling along the x-axis is described by the equation y (x,t) = 0.005 cos $(\alpha x - \beta t)$. If the wavelength and the time period of the wave are 0.08 m and 2.0 s,

respectively, then α and β in appropriate units are :

A. $\alpha = 25.00\pi, \beta = \pi$

B. $\alpha = \frac{0.08}{\pi}, \beta = \pi\frac{2.0}{\pi}$

C. $\alpha = \frac{0.04}{\pi}, \beta = \pi\frac{1.0}{\pi}$

D. $\alpha = 12.50\pi, \beta = \frac{\pi}{2.0}$

Answer: A

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52. Three sound waves of equal amplitudes have frequencies $(v - 1)$, v , $(v + 1)$. They surperpose to give beats. The number of beats produced per second will be :

A. 3

B. 2

C. 1

D. 4

Answer: C

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Watch video solution

53. A motor cycle starts from rest and accelerates along a straight path at 2 m/s^2. At the starting point of the motoer cycle there is a stationary electric siren. How far has the motor cycle gone when the driver hears the frequency of the siren at 94% of its value when the motor cycle was at rest ? (speed of sound = 330 ms^{-1})

A. 146 m

B. 196 m

C. 49 m

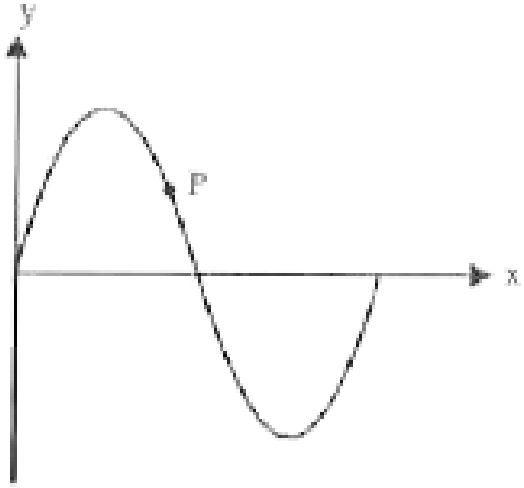
D. 98 m

Answer: D

Watch Video Solution

54. A transvers sinusoidal wave move along a string in the positive x-direction at a speed of 10 cm/s. The wavelength of the wave is 0.5 m and its amplitude is 10 cm . At a particular time t, the snap-shot of the wave is shown in

figure . The velocity of point P when its displacement is 5 cm is :



A. $\frac{\sqrt{3\pi}}{50}\hat{j}$ m/s

B. $-\frac{\sqrt{3\pi}}{50}\hat{j}$ m/s

C. $\frac{\sqrt{3\pi}}{50}\hat{i}$ m/s

D. $-\frac{\sqrt{3\pi}}{50}\hat{i}$ m/s

Answer: A

 Watch Video Solution

55. A 20 cm long string, having a mass of 1.9 g, is fixed at both the ends. The tesion in the string is 0.5 N. The string is set into vibrations using an external vibrator of frequency 100 Hz. Find te separation (in cm) between the successive nodes on the string .

A. 3.6 cm

B. 10 cm

C. 15 cm

D. 20 cm

Answer: A

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56. A hollow pipe of length 0.8 m is closed at one end. At its open end a 0.5 m long uniform string as vibrating in its second harmonic and it resonates with the fundamental frequency

of te pipe. If the tension in the wire is 50 N and the speed of sound is 320 ms^{-1} the mass of the string is :

A. 5 grams

B. 10 grams

C. 20 grams

D. 40 grams

Answer: B

Watch Video Solution

57. A source of sound producing wavelength 50 cm is moving away from a stationay observer with $\left(\frac{1}{5}\right)^{th}$ speed of sound. Then what is the wavelength of sound received by the observer?

A. 55 cm

B. 40 cm

C. 60 cm

D. 80 cm

Answer: C

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58. A train moving towards a hill at a spped 72 km/her sounds a whistle of frequency 500 Hz. A wind is blowing from the hill at a speed of 36 km/hr. If the speed of sound in air is 340 m/s, the frequency heard by a man on the hill is

A. 532.5 Hz

B. 565.0 Hz

C. 516.0 Hz

D. None of the these .

Answer: A

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59. A vibrating tuning fork generates a wave given by $y = 0.1 \sin \pi (0.1x - 2t)$, Where x and y are in metre and t is in second. The distance travelled by the wave while the fork completes 30 vibrations is :

A. 600 m

B. 36 m

C. 20 m

D. 200 m

Answer: A

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60. If the tension and diameter of a sonometer wire of fundamental frequency vare doubled and density is halved, then its fundamental frequency will become

A. v/4

B. v

C. $\sqrt{2}$ v

D. v/$\sqrt{2}$

Answer: B

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61. A string in a musical instrument is 50 cm long and its fundamental frequency is 800 Hz.

If a frequency of 1000 Hz is to be produced, then required length of string is :

A. 62.5

B. 50 cm

C. 40 cm

D. 37.5 cm

Answer: C

Watch Video Solution

62. An observer moves towards a stationary source of sound with speed $\frac{1}{5}$ th of the speed of sound. The wavelength and frequency of sound emitted are λ and f respectively. The apparent frequency and wavelength recorded by the observer are respectively :

A. 1.2 f, 1.2 λ

B. f,1.2 λ

C. $1.2f, \lambda$

D. $0.8f, 0.8\lambda$.

Answer: C

Watch Video Solution

63. A person hears the sound of a jet aeroplane after it has passed over his head. The angle of the jet plane with the horizontal when the sound appears to be coming vertically downwards is 60° . If the velocity of sound is v, then the velocity to the jet plane is :

A. v

B. $v\sqrt{3}$

C. 2v

D. $\sqrt{2}$ v.

Answer: B

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64. A stone is hung in air from a wire which is stretched over a sonometer . The bridges of the sonometer are 40 cm apart when the wire

is in unison with a tuning fork of frequency 256. When the stone is completely immersed in water, the length between the bridges is 22 cm for re-establishing unison. The specific gravity of the material of the stone is :

A. $256 \times \frac{40}{22}$

B. $\frac{(40)^2}{(40)^2 + (22)^2}$

C. $\frac{(40)^2}{(40)^2 - (22)^2}$

D. $256 \times \frac{22}{40}$

Answer: C

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65. The intensity of a sound wave while passing through an elastic medium falls down by 10% as it covers one meter distance through the medium. If the initial intensity of the sound wave was 100 db its value after it has passed through 3 meter thickness of the medium will be

A. 60 decibel

B. 72.9 decibel

C. 81 decibel

D. 70 decibel.

Answer: B

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66. A string of length 0.4 m and mass 10^{-2} kg is tightly clamped at its ends. The tension in the string is 1.6 N. Identical wave pulses are produced at one end in equal intervals of times Δt. the minimum value of Δt, which

allows constructive interference between successive pulses , is :

A. 0.05 s

B. 0.20 s

C. 0.40 s

D. 0.10 s

Answer: D

 Watch Video Solution

67. An organ pipe enclosed at one end has fundamental frequency of 1500 Hz. The maximum number of overtones generated by this pipe which a normal person can hear, is :

A. 6

B. 11

C. 9

D. 13

Answer: A

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Watch Video Solution

68. The amplitude of wave distance propagating in the positive X-direction is given by y = $\frac{1}{(1+x)^2}$ at time t = 0 and y = $\frac{1}{1+(x-1)^2}$ at t = 1 seconds here x and y are in metre. The shape of wave disturbance does not change during propagation. The velocity of wave is :

A. $2ms^{-1}$

B. $15ms^{-1}$

C. $1ms^{-1}$

D. $0.5ms^{-1}$

Answer: D

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69. A stationary wave on a stretched string has an equation given by y = 10 sin $\frac{2\pi x}{3}$ cos 8 πt, where x and y are in cm and t is in second. Then separation between the two adjacent nodes is given by :

A. 1.5 cm

B. 3 cm

C. $\frac{1}{3}$cm

D. $\frac{1}{6}$ cm

Answer: A

Watch Video Solution

70. The wave described by y = 0.25 sin $(10\pi x - 2\pi t)$ where x and y are in metres and t in seconds, is a wave travelling along the :

A. $+$ ve x -direction with frequency π Hz and wavelength $\lambda = 0.2$ m.

B. $+$ ve x-direction with frequency 1 Hz and wavelength $\lambda = 0.2$ m.

C. $-$ ve x-direction with amplitude 0.25 m and wavelength $\lambda = 0.2$ m

D. $-$ ve x -direction with frequency 1 Hz.

Answer: B

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71. The driver of a car travelling with speed 30 m/sec towards a hill sounds a horn of frequency 600 Hz. If the velocity of sound in air 330 m/s , the frequency of reflected sound as heard by driver is :

A. 555.5 Hz

B. 720 Hz

C. 500 Hz

D. 550 Hz

Answer: B

Watch Video Solution

72. Each of the two strings of length 51.6 cm and 49.1 cm are tensioned separately by 20 N force. Mass per unit length of both the strings is same and equal to 1 g/m. When both the strings vibrate simultaneously the number of beats is :

A. 7

B. 8

C. 3

D. 5

Answer: A

Watch Video Solution

73. Two sources of sound placed close to each other, are emitting progressive waves given by

$y_1 = 4\sin 600\pi t$ and $y_2 = 5\sin 608\pi t$

An observer located near these two sources of sound will hear :

A. 4 beats per sound with intensity ratio 81

: 1 between waxing and waning

B. 4 beats per sound with intensity ratio 25

: 16 between waxing and waning

C. 8 beats per sound with intensity ratio 25

: 16 between waxing and waning

D. 8 beats per sound with intensity ratio 81

: 1 between waxing and waning

Answer: A

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Multiple Choice Questions Level Iii

1. The transverse displacement y(x,t) of a wave on a string is given by y (x,t) = $e^{-\left(ax^2+bt^2+2\sqrt{\text{abxt}}\right)}$. This represents a :

A. wave moving in -x direction with speed $\sqrt{\frac{b}{a}}$

B. Standing wave of frequency $\sqrt{b}$

C. Standing wave of frequency $\frac{1}{\sqrt{b}}$

D. wave moving in + x direction with speed

$$\sqrt{\frac{a}{b}}$$

Answer: A

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2. A travelling wave represented by y = A sin $(\omega t - kx)$ is superimposed on another wave represented by y = A sin $(\omega t + kx)$. the resultant is :

A. A wave travelling along + x direction

B. A wave travelling along - x direction

C. A standing wave having nodes at a = $\frac{n\lambda}{2}$

, n = 0, 1, 2 .....

D. A standing wave having nodes at x = $\left(n+\frac{1}{2}\right)\frac{\lambda}{2}$, n = 0, 1, 2 .....

Answer: D

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3. Statement - 1 :

Two longitudinal waves given by equations : y_1 (x,t) = 2 a sin $(\omega t - kx)$ and $y_2(x,t) = a\sin(2\omega t - 2kx)$ will have equal intensity .

Statement -2 :

Intensity of waves of given frequency in same medium is proportional to square of amplitude only .

A. Satement-I is true, statement -II is false.

B. Statement -I is true, Statement -II is true, Statement -II is the correct explanation of Statement -I.

C. Statement -I is true, Statement -II is true, Statement -II is not the correct explanation of Statement -I.

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

Answer: A

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4. A police car with a siren of frequency 8 khz is moving with uniform velocity 36 km/hr towards a tall building which reflects the sound waves. The speed of sound in air is 320 m/s. The frequency of the siren heard by the car driver is

A. 8.50 kHz

B. 8.25 kHz

C. 7.75 kHz

D. 7.50 kHz

Answer: A

 Watch Video Solution

5. A cylindrical tube, open at both ends has a fundamental frequency f in air. This tube is dipped vertically in water so that half of it is in water. The fundamental frequency of the air column is now

A. 2f

B. f

C. fl 2

D. 3 fl 4

Answer: B

Watch Video Solution

6. A sonometre wire of length 1.5 m is made of steel. The tension in it produces an elastic strain of 1% . What is the fundamental frequency of steel if density and elasticity of

steel are 7.7 $\times 10^3$ kg/m^3 and 2.2 $\times 10^{11}$ N/m^2 respectively ?

A. 178.2 Hz

B. 200.5 Hz

C. 770 Hz

D. 188.5 Hz

Answer: A

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7. A pipe of length 85 cm is closed from one end. Find the number of possible natural oscillations of air column is the pipe whose frequencies lie below 1250 Hz. The velocity of sound in air is 340 m/s.

A. 4

B. 12

C. 8

D. 6

Answer: D

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8. A train is moving on a straight track with speed 20 ms^{-1}. It is blowing its whistle at the frequency of 1000 Hz. The percentage change in the frequency heard by a person standing near the track as the train passes him is (speed of sound = 320 ms^{-1}) close to :

A. $12\ \%$

B. 0.18

C. 0.24

D. 0.06

Answer: A

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Recent Competitive Questions

1. A bat flies at steady speed of $4\ \mathrm{m\,s^{-1}}$ emitting a sound of $f = 90 \times 10^3$. Hz It is flying horizontally towards a vertical wall. The frequency of the reflected sound as detected

by the bat will be

(Take velocity of sound in air as $330 \ \mathrm{m\,s^{-1}}$)

A. 92.1×10^3 Hz

B. 89.1×10^3 Hz

C. 88.1×10^3 Hz

D. 87.1×10^3 Hz

Answer: A

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2. A clsoed organ pipe and an open organ pipe of same length produce 2 beats /second while vibrating in their fundamental modes. The length of the open organ pipe is halved and that of closed pipe is doubled . Then the number of beats produced per second while vibrating in the fundamental mode is :

A. 8

B. 7

C. 2

D. 6

Answer: B

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3. A uniform wire of length L, diameter D and density ρ is stretched under a tension T. The correct relation between its fundamental frequency $'f'$, the length L and the diameter D is

A. $f \propto \frac{L}{D^2}$

B. $f \propto \frac{1}{D^2}$

C. $f \propto \frac{1}{LD}$

D. $f \propto \frac{1}{L\sqrt{D}}$

Answer: C

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4. The equation of a wave is given by

$$y = 10\sin\left(\frac{2\pi}{45}t + \alpha\right)$$

If the displacement is 5 cm at t=0 ,then the total phase at t=7.5 sec is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{6}$

D. π .

Answer: B

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5. Two tuning forks,A and B produce notes of frequencies 258 Hz and 262 Hz.An unknown note sounded with A produces certain

beats.When the same note is sounded with B ,th beat frequeny gets doubled.The unknown frequency

A. 250 Hz

B. 252 Hz

C. 254 Hz

D. 256 Hz.

Answer: C

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6. A wire under tension vibrates with a fundamental frequency of 600 Hz.If the length of the wire is doubled,the radius is halved and the wire is made to vibrate under one-ninth the tension.Then the fundamental frequency will become

A. 200 Hz

B. 300 Hz

C. 600 Hz

D. 400 Hz

Answer: A

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7. Which of the following is incorrect ?

A. If the wave is longitudinal, it must be a mechanical wave.

B. If the wave is mechanical , it may OR may not been transverse wave

C. Mechanical waves cannot propagate in vacuum

D. Diffraction helps us to distinguish between sound wave and light wave.

Answer: D

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8. Intensity level of sound whose intensity is $10^{-8} Wm^{-2}$ is ..... dB

A. 8

B. 4

C. 40

D. 80

Answer: C

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9. The equations of a transverse wave is given by $y = 0.05 \sin \pi(2t - 0.02x)$, where x,y are in metre and t is in second. The minimum

distance of separation between two particles which are in phase and the wave velocity are respectively.....

A. 50m 50 ma^{-1}

B. 100 m, 100 ms^{-1}

C. 50 m, 100 ms^{-1}

D. 100m , 50 ms^{-1}

Answer: B

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10. The frequency of the second overtone of the open pipe is equal to the frequency of first overtone of the closed pipe. The ratio of the lengths of the open pipe and the closed pipe is

A. $2:1$

B. $1:2$

C. $1:3$

D. $3:1$

Answer: A

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11. A person with vibrating tuning fork of frequency 338Hz is moving towards a vertical wall with a speed of $2ms^{-1}$. Velocity of sound in air is $340ms^{-1}$. The number of beats heard by that person per second is

A. 2

B. 4

C. 6

D. 8

Answer: B

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12. A metallic wire of 1 m length has a mass of 10×10^{-3}kg. If a tension of 100 N is applied to a wire, what is the speed of transverse wave ?

A. 100 ms^{-1}

B. 10 ms^{-1}

C. 200 ms^{-1}

D. 0.1 ms^{-1}

Answer: A

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13. A train is approaching towards a platform with a speed of 10 m s^{-1} while blowing a whistle of frequency 340 Hz. What is the frequency of whistle heard by a stationary observer on the platform ? Given speed of sound $= 340ms^{-1}$.

A. 330 Hz

B. 350 Hz

C. 340 Hz

D. 360 Hz

Answer: B

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14. A pipe of 30 cm long and open at both the ends produces harmonics. Which harmonic

mode of pipe resonates a 1.1 kHz source ?

Given speed of sound in air $= 330 ms^{-1}$.

A. Fifth harmonic

B. Fourth harmonic

C. third harmonic

D. Second harmonic

Answer: D

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15. A streched string is vibrating in the second overtone , then the number of nodes and antinodes between the ends of the string are respectively

A. 3 and 2

B. 2 and 3

C. 4 and 3

D. 3 and 4

Answer: B

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16. When two tunning forks A and B are sounded together , 4 beats per second are heard . The frequency of the fork B is 384 Hz . When one of the prongs of the fork A is filled and sounded with B , the beat frequency increases , then the frequency of the fork A is

A. 388 Hz

B. 389 Hz

C. 380 Hz

D. 379 Hz.

Answer: A

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17. If the surface is a perfect reflector. The change in momentum of the wave after falling on the surface is :

A. P

B. 2P

C. 1/2 P

D. $-2P$

Answer: D

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18. A steel wire has a lengh of 90 cm which is under a constant tension of 100 N. The speed of the transverse waves that can be produced in the wire will be (take the mass of the steel wire be 6×10^{-3} kg) ,

A. 50 m/s.

B. 50 cm/s

C. 1/3 $\sqrt{6}$ m/s

D. 50 $\sqrt{6}$ m/s

Answer: D

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