PHYSICS

BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

WAVES

Others

1. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz

and 260 Hz. What is the fundamental frequency of the system?

A. 10Hz

B. 20 Hz

C. 30 Hz

D. 40 Hz

Answer: b

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2. Two cars moving in opposite direction approach each other with speed of $22m/s$ and $16.5m/s$ respectively . The driver of the first car blows a horn having a frequency $400Hz$. The frequency heard by the driver of the second car is $[$ velocity of the sound $340m/s]$

A. 350Hz

B. 361 Hz

C. 411 Hz

D. 448Hz

Answer: d

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3. A siren emitting a sound of frequency 800 Hz moves away from an observer towards a cliff at a speed of $15ms^{-1}$. Then the frequency of sound that the observer hears in the echo reflected from the cliff is (Take velocity of sound in air $= 330ms^{-1}$)

A. 800Hz

B. 838Hz

C. 885 Hz

D. 765Hz

Answer: b

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4. A uniform rope of legnth L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the

rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2. The ratio $\frac{\lambda_2}{\lambda_1}$ is

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

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

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

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

Answer: a

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5. The second overtone of an open organ pipe has the same frequency as the first overtone of a closed pipe L metre long. The length of the open pipe will be

A. L

B. 2L

C. L/2

D. 4L

Answer: b

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

A. 1

B. 4

C. 3

D. 2

Answer: a

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7. The fundamental frequency of a closed organ pipe of length $20cm$ is equal to the second overtone of an organ pipe open at both the ends. The length of organ pipe open at both the ends is

A. 80cm

B. 100 cm

C. 120cm

D. 140 cm

Answer: c

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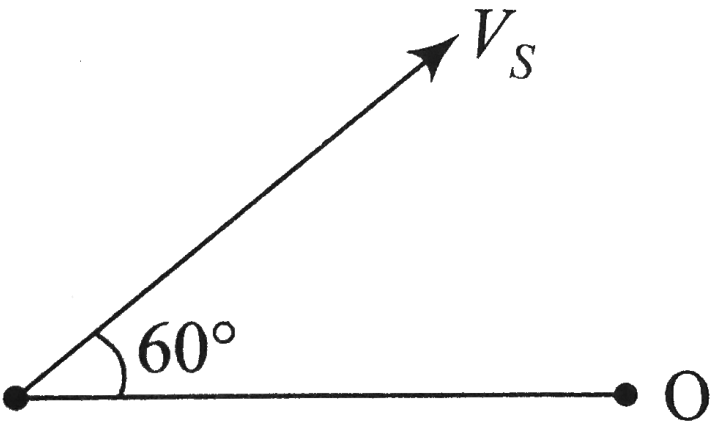
8.



A source of sound S emitting waves of

frequency $100Hz$ and an observer O are located at some distance from each other. The source is moving with a speed of $19.4ms^{-1}$ at an angle of 60° with the source observer line as shown in the figure. The observer is at rest. The apparent frequency observed by the observer (velocity of sound in air $330ms^{-1}$) is

A. 100 Hz

B. 103Hz

C. 106 Hz

D. 97 Hz

Answer: b

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9. If $n_1, n_2 \text{and} n_3$ are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by

A. $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$

B. $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}}$

C. $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$

D. $n = n_1 + n_2 + n_3$

Answer: a

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10. The number of possible natural oscillations of air column in a pipe closed at one end of length 85 cm whose frequencies lie below 1250 Hz are (velocity of sound $= 340 ms^{-1}$).

A. 4

B. 5

C. 7

D. 6

Answer: d

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11. A speed ign motorcyclist sees traffic ham ahead of him. He slows doen to $36km/h$ He finds that traffic has eased and a car moving

ahead of him at $18km/h$ is honking at a frequency of 1392 Hz. If the speed of sound is $343m/s$, the frequency of the honk as heard by him will be

A. 1332 Hz

B. 1372 Hz

C. 1412 Hz

D. 1454 Hz

Answer: c

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12. A wave travelling in the $+ve$ x-direction having displacement along y-direction as $1m$, wavelength 2π m and frequency of $1/\pi$ Hz is represented by

A. $Y = \sin(\ \times\ - 2t)$

B. $Y = \sin(2\pi \times\ - 2t)$

C. $Y = \sin(10\pi \times\ - 20\pi t)$

D. $Y = \sin(2\pi \times\ - 2\pi t)$

Answer: a

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13. If we study the vibration of a pipe open at both ends, then the following statements is not true

A. open end will be antinode

B. odd harmonics of the fundamental frequency

C. All harmonics of the fundamental frequency will be generated

D. pressure change will be maxium at both ends.

Answer: d

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14. A source of unknown frequency gives 4 beats//s, when sounded with a source of known frequency 250 Hz. The second harmonic of the source of unknown frequency gives five

beats per second, when sounded with a source of frequency 513 The unknown frequency is

A. 245 hz

B. 246 Hz

C. 240 Hz

D. 260 Hz

Answer: a

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15. If v_1, v_2 and v_3 are the fundamental frequencies of three segments of stretched string , then the fundamental frequency of the overall string is

A. $\sqrt{v} = \sqrt{v_1} + \sqrt{v_2} + \sqrt{v_3}$

B. $v = v_1 + v_2 + v_3$

C. $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2} + \frac{1}{v_3}$

D. $\frac{1}{\sqrt{v}} = \frac{1}{\sqrt{v_1}} + \frac{1}{\sqrt{v_2}} + \frac{1}{\sqrt{v_3}}$

Answer: c

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16. Two sources of sound placed close to each other are wmitting 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 beat/s with internsity ratio 25: 16 between waxing and waning

B. 8 beat/s with intensity ratio 25 :16 between waxing and waning

C. 8 beat/s with intensity ratio 81:1 between waxing and waning

D. 4 beat/s with intensity ratio 81: 1 between waxing and waning

Answer: d

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17. Two waves are represented by the equations $y_1 = a\sin(\omega t = kx + 0.57)m$ and $y_2 = a\cos(\omega t + kx)$m where x is in metre and

t in second. The phase difference between them is

A. 1.25 rad

B. 1.57 rad

C. 0.57 rad

D. 1 rad

Answer: d

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18. Sounds waves travel at $350m/s$ through a warm air and at $3500m/s$ through brass. The wavelength of a $700Hz$. Acoustic wave as it enters brass from warm air

A. increases by a factor 20

B. increases by factor 10

C. decreases by a factor 20

D. decreases by a factor 10

Answer: b

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19. A transverse wave is represented by $y = A\sin(\omega t - kx)$. For what value of the wavelength is the wave velocity equal to the maximum particle velocity?

A. $\pi A/2$

B. πA

C. $2\pi A$

D. A

Answer: c

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20. A tuning fork of frequency 512 Hz makes 4 beats//s 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. 510 Hz

B. 514 Hz

C. 516 Hz

D. 508 Hz

Answer: d

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21. The driver of a car travelling with speed $30ms^{-1}$ towards a hill sounds a horn of frequency 600 Hz. If the velocity of sound in air

is $330ms^{-1}$, the frequency of reflected sound as heard by driver is

A. 550 Hz

B. 555.5 Hz

C. 720 Hz

D. 500 Hz

Answer: c

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22. A wave in a string has an amplitude of $2cm$. The wave travels in the $+ve$ direction of x axis with a speed of $128ms^{-1}$ and it is noted that 5 complete waves fit in $4m$ length of the string. The equation describing the wave is

A. $y = (0.02)m\sin(7.85 \times \ + 1005t)$

B. $y = (0.02)m\sin(15.7 \times \ - 2010t)$

C. $y = (0.02)m\sin(15.7 \times \ + 2010t)$

D. $y = (0.02)m\sin(7.85 \times \ - 1005t)$

Answer: d

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23. 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. negative x-direction with frequency 1 Hz

B. Postive x- direction with frequency pi Hz and wavelength$\lambda = 0.2m$

C. positive x- direction whith frequency 1 Hz and wavelength $\lambda = 0.2m$

D. negative x - direction with amplitude 0.25 m and wavelength $\lambda = 0.2m$

Answer: c

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24. Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the

same direction. The sum of the maximum and minimum intensities is:

A. $l_1 + l_2$

B. $\left(\sqrt{l_1} + \sqrt{l_2}\right)^2$

C.

D. $2(l_1 + l_2)$

Answer: d

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25. Which one the following statements is ture?

A. both light and sound waves in air are transverse

B. The sound waves in air are longitudinal while the light waves are transverse

C. Both light and sound waves in air are longitudinal

D. Both light and sound waves can travel in varcuum

Answer: b

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26. The time of reverberation of a room A is one second. What will be the time (in seconds) of reverberation of room, having all the dimensions double of those of room A?

A. 2

B. 4

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

D. 1

Answer: a

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27. A transverse wave propagating along x-axis is represented by: $y(x, t) = 8.0 \sin\left(0.5\pi x - 4\pi t - \frac{\pi}{4}\right)$ Where

x is in metres and t is in seconds. The speed of the wave is:

A. $4\pi m / s$

B. $0.5\pi m / s$

C. $\frac{\pi}{4} m / s$

D. 8 m/s

Answer: d

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28. Two sound waves with wavelengths $5.0m$ and $5.5m$ respectively, each propagates in a gas with velocity $30m/s$ We expect the following number of beats per second:

A. 12

B. zero

C. 1

D. 6

Answer: d

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29. Two vibrating tuning fork produce progressive waves given by $y_1 = 4\sin 500\pi t$ and $y_2 = 2\sin 506\pi t$. Number of beats produced per minute is :-

A. 360

B. 180

C. 3

D. 60

Answer: b

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30. A point source emits sound equally in all directions in a non-absorbing medium. Two point P and Q are at distance of $2m$ and $3m$ respectively from the source. The ratio of the intensities of the wave at P and Q is :

A. $9:4$

B. $2:3$

C. $3:2$

D. $4:9$

Answer: a

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31. The two waves are represented by

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

$$Y_2 = 10^{-2}\cos\left(100t + \frac{x}{50}\right)m$$

where x is ihn metres and t in seconds. The

phase difference between the waves is approximately:

A. 1.07 red

B. 2.07 red

C. 0.5 red

D. 1.5 red

Answer: a

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32. A car is moving towards a high cliff. The car driver sounds a horn of frequency f. The reflected sound heard by the driver has a frequency $2f$. if v be the velocity of sound, then the velocity of the car, in the same velocity units, will be

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

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

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

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

Answer: d

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

A. $f, 1.2\lambda$

B. $0.8f, 0.8\lambda$

C. $1.2f, 1.2\lambda$

D. $1.2f, \lambda$

Answer: b

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34. A whistle revolves in a circle with an angular speed of $20 rad/\sec$ using a string of length $50 cm$. If the frequency of sound from

the whistle is $385Hz$, then what is the minimum frequency heard by an observer which is far away from the centre in the same plane? $v = 340m/s$

A. 385 Hz

B. 374 Hz

C. 394 Hz

D. 333Hz

Answer: c

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35. A wave travelling in positive X-direction with $A = 0.2m$ has a velocity of $360m/\sec$ if $\lambda = 60m$, then correct exression for the wave is

A. $y = 0.2\sin 2\pi\left(6t + \frac{x}{60}\right)$

B. $y = 0.2\sin \pi\left(6t + \frac{x}{60}\right)$

C. $y = 0.2\sin 2\pi\left(6t - \frac{x}{60}\right)$

D. $y = 0.2\sin \pi\left(6t - \frac{x}{60}\right)$

Answer: d

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36. The equation of a wave is given by $y = a\sin\left(100t - \frac{x}{10}\right)$ where x and y are in metre an t in second, the velocity of wave is

A. 0.1m/s

B. 10 m/s

C. 100m/s

D. 1000 m/s

Answer: d

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37. A wave enters to water form air. In air frequency, wavlength intensity and velocity n_1, λ_1, I_1 and v_1 resqectively In water the corresponding quantities are n_2, λ_2, I_2 and v_2 repectively, then

A. $l_1 = l_2$

B. $n_1 = n_2$

C. $v_1 = v_2$

D. $\lambda_1 = \lambda_2$

Answer: b

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38. Equation for two waves is given as $y_1 = a\sin(\omega t + \phi_1), y_2 = a\sin(\omega t + \phi_2)$. If ampitude and time period of resultant wave does not change, then calculate $(\phi_1 - \phi_2)$.

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

B. $2\frac{\pi}{3}$

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

D. $\frac{\pi}{4}$

Answer: b

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39. Masses $M_A \text{and} M_B$ hanging from the ends of strings of lengths $L_A \text{and} L_B$ are executing simple harmonic motions. If their frequencies are $f_A = 2f_B$, then

A. $l_A = 4l_B$ regardles of masses

B. $l_B = 4l_A$ reagardless of masses

C. $M_A = 2M_B, l_A = 2l_B$

D. $M_B = 2M_A, l_B = 2l_A$

Answer: b

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40. A sonometer wire when vibrated in full length has frequency n. Now, it is divided by the help of bridges into a number of segments

of lenths $l_1, l_2, l_3 \ldots$ when vibration these segments have frequencies $n_1, n_2, n_3, , ,$ Then, the correct relation is

A. $n = n_1 + n_2 + n_3 + \ldots\ldots\ldots$

B. $n^2 = n_1^2 + n_2^2 + n_3^2 + \ldots\ldots\ldots$

C. $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} + \ldots\ldots\ldots$

D.

$$\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}} + \ldots\ldots\ldots$$

Answer: c

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41. Two sound sources emitting sound each of wavelength λ are fixed at a given distance apart. A listener moves with a velocity u along the line joining the two suorces. The number of beats heard by him per second is

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

B. $\frac{u}{\lambda}$

C. $\frac{u}{2\lambda}$

D. $\frac{\lambda}{u}$

Answer: a

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42. Two waves of wavelength 50 cm and 51 cm produce 12 beat/s . The speed of sound is

A. 306 m/s

B. 331 m/s

C. 340 m/s

D. 360 m/s

Answer: a

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43. A standing wave having 3 nodes and 2 antinodes is formed between two atoms having a distance 1.21Å between them. The wavelength of the standing wave is

A. 1.21 Å

B. 1.42Å

C. 6.05Å

D. 3.63Å

Answer: a

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44. In a sinusoidal wave the time required for a particular point to move from equilibrium position to maximum displacement is $0.17s$, then the frequency of wave is:

A. 1.47 Hz

B. 0.36 Hz

C. 0.73 Hz

D. 2.94 Hz

Answer: a

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45. A vehicle, with a horn of frequency n is moving with a velocity of 30 m/s in a direction perpendicular to the straight line joining the observer and the vehicle. The observer

perceives the sound to have a frequency $n + n_1$. Then (if the sound velocity in air is 300 m/s)

A. $n_1 = 10n$

B. $n_1 = 0$

C. $n_1 = 0.1n$

D. $n_1 = -0.1n$

Answer: b

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46. A transverse wave is represented by the equation

$$y = y_0 \sin. \frac{2\pi}{\lambda}(vt - x)$$

For what value of λ, the maximum particle velocity equal to two times the wave velocity?

A. $\lambda = 2\pi y_0$

B. $\lambda = \frac{\pi y_0}{3}$

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

D. $\lambda = \pi y_0$

Answer: d

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

A. 2f

B. $3\frac{f}{2}$

C. f

D. $\frac{f}{2}$

Answer: c

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48. A pulse of a wave train travel s along a stretched string and reaches the fixed end of the string and reaches the fixed end of the string.it will be reflected back with

A. a phase change of 180° with velocity reversed

B. the same phase as the incident pulse with no reversal of velocity

C. a phase change of 180° with no reveral of velocity

D. the same phase as the incident pulse but with velocity reversed

Answer: a

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49. Stationary waves are produced in 10 m long stretched string. If the string vibrates in 5 segments and wave velocity 20 m/s then the frequency is :-

A. 10 Hz

B. 5 Hz

C. 4 Hz

D. 2 Hz

Answer: b

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50. The equation of a sound wave is $y = 0.0015 \sin(62.4x + 316t)$ the wavelength of this wave is

A. 0.4 unit

B. 0.3 unit

C. 0.2 unit

D. 0.1 unit

Answer: d

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51. Two waves of same frequency and intensity superimpose on each other in opposite phases. After the superposition the intensity and frequency of waves will.

A. increase

B. decrease

C. remain constant

D. become zero

Answer: d

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52. what is the effect of humidity on sound waves when humidity increases?

A. speed of sound waves increases

B. speed of sound waves decreases

C. speed of sound waves remains same

D. speed of sound waves becomes zero

Answer: a

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53. A star which is emitting radiation at a wavelength of 5000A is approaching the earth with a velocity of $1.50 \times 10^6 m/s$ The change in wavelegth of the radiation as received on the earth is

A. 0.25 Å

B. 2.5 Å

C. 25 Å

D. 250 Å

Answer: c

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54. The speed of a wave in a medium is 760 m/s. If 3600 waves are passing through a point in the medium in 2 min, then their wavelength is

A. 13.8 m

B. 25.3 m

C. 41.5 m

D. 57.2 m

Answer: b

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55. A hospital uses an ultrasonic scanner to locate tumour in a tissue. What is the wavelength of sound in a tissue in which the

speed of sound is $1.7km/s$? The operating frequency of the scanner is $4.2MHz$.

A. 4×10^{-4} m

B. $8 \times 10(-4)$ m

C. 4×10^{-3}m

D. 8×10^{-3} m

Answer: a

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56. Two waves are said to be cherent, if they have

A. same phase but different amplitude

B. same ferquency but different amplitude

C. same frequency phase and amplitude

D. different frequnecy, phase and amplitude

Answer: c

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57. Two waves are approaching each other with a velocity of $20m/s$ and frequency n. The distance between two consecutive nudes is

A. $\frac{20}{n}$

B. $\frac{10}{n}$

C. $\frac{5}{n}$

D. $\frac{n}{10}$

Answer: b

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58. From a wave equation

$$y = 0.5 \sin\left(\frac{2\pi}{3.2}\right)(64t - x).$$

the frequency of the wave is

A. 5 Hz

B. 15 Hz

C. 20 Hz

D. 25 Hz

Answer: c

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

A. 5m/s

B. 10 m/s

C. 20 m/s

D. 40 m/s

Answer: c

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60. A standing wave is represeneted by $y = a\sin(100t)\cos(0.01)x$ in second and x is in ,metre. Velocity of wave is

A. 10^4 m/s

B. 1 m/s

C. $10^{\frac{m}{s}}$

D. none of these

Answer: a

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61. Which of the following equation reprsents a wave ?

A. $y = a \sin \omega t$

B. $y = a \cos kx$

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

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

Answer: c

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62. which one of following is a simple harmonic motoin?

A. Ball bouning between two rigid vertical walls

B. particle moving in a circle with unifrom speed

C. Wave moving through a string a string fixed at both ends

D. Earth spinnig about its own axis

Answer: c

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63. A wave has SHM (simple harmonic motion) whose period is 4s while another periods 3 s. If both are combined, then the resultant wave will have the period equal to

A. 4 s

B. 5 s

C. 12 s

D. 3 s

Answer: c

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64. A stretcded sting resomates with tuning fork of frequency 512 Hz. When length o fthe string is 0.5 m. the length of the string

required to vibrate resonantly with a tuning fork of frequeny 256 Hz would be

A. 0.25 m

B. 0. 5 m

C. 1 m

D. 2 m

Answer: c

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65. For production of beats the two souces must have

A. differnet frequencies and saem ampltude

B. different frequencies

C. ifferent frequencies, same amplitude and same phase

D. different frequencies and same phase

Answer: c

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66. the frequenct of sinusoidal wave, 0.40 cos (2000t + 0.80) would be

A. $1000\pi Hz$

B. 2000 Hz

C. 20 Hz

D. $\frac{1000}{\pi} Hz$

Answer: b

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67. with the propagtion of a longitudinal wave through a material medium. The quantion transmitted in the propagation diretion are

A. energy , momentum and mass

B. energy

C. energy and mass

D. energy and linear momentum

Answer: d

View Text Solution

68. two trains move towards each other sith the same speed. The speed of sound is 340 m/s. If the height of the tone of the whistle of one of them heard on the other changes

A. 20 m/s

B. 2 m/s

C. 200 m/s

D. 2000 m/s

Answer: a

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69. A closed organ pipe (closed at one end) is excited to support the third overtone. It is found that air in the pipe has

A. three nodes and three antinodes

B. three nodes and four antinodes

C. four nodes and three antinodes

D. four nodes and four antinodes

Answer: d

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70. The transverse wave represented by the equation $y = 4\sin\left(\frac{\pi}{6}\right)\sin(3x - 15t)$ has

A. amplitude = 4π

B. wavelength $= 4\frac{\pi}{3}$

C. speed of propagation = 5

D. period $= \frac{\pi}{15}$

Answer: c

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71. The velocity of sound waves in air is $330m/s$. For a particluar sound in air, a path difference of $40cm$ is equivalent to a phase difference of 1.6π. The frequency of this wave is

A. 165 Hz

B. 150 Hz

C. 660 Hz

D. 330 Hz

Answer: c

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72. A 5.5 m length of string has a mass of 0.035 kg. If the rension in the string is 77 N the speed of a wave on the string is

A. $110ms^{-1}$

B. $165ms^{-1}$

C. $77ms^{-1}$

D. $102ms^{-1}$

Answer: a

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73. If the amplitude of sound is doubled and the reduced to one- fourth the intesity of sound at the same point will

A. incresase by a factor of 2

B. decrease by a factor of 2

C. decrease by a factor of 4

D. remains unchanged

Answer: c

View Text Solution

74. the velocity of sound in any gas deponds upon

A. wavelength of sound

B. Density and elasticity of gas

C. intensity of sound waves

D. ampiltude and frequency of sound

Answer: b

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75. If the equation of progressive wave is given by $y = 4\sin\pi\left[\frac{t}{5} - \frac{x}{9} + \frac{\pi}{6}\right]$ then, which of

the following is correct ? (Assume SI units)

A. v= 5cm

B. $\lambda = 18cm$

C. a = 0.04 cm

D. f =50 Hz

Answer: b

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