PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

WAVES AND SOUND

Ordinary Thinking

1. Which of the following statements is wrong ?

A. Sound travels in straight line

B. Sound is a form of energy

C. Sound is a longitudinal wave

D. Sound travels faster in vacuum than in air

Answer: D

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2. The relation between frequency n wavelength λ and velocity of propagation v of wave is

A. $n = v\lambda$

B. $n = \lambda / v$

C. $n = v / \lambda$

D. $n = 1 / v$

Answer: C

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3. Ultrasonic, Infrasonic and audible waves travel through a medium with speeds V_u, V_i and V_a respectively, then

A. V_u, V_i and V_a are nearly equal

B. $V_u \geq V_a \geq V_i$

C. $V_u \leq V_a \leq V_i$

D. $V_a \leq V_u$ and $V_u \approx V_i$

Answer: A

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4. The distance between two consecutive crests in a wave train produced in string is 5 m. If two complete waves pass through any point per second, the velocity of wave is :-

A. $10cm/\sec$

B. $2.5cm / \sec$

C. $5cm / \sec$

D. $15cm / \sec$

Answer: A

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5. A tuning fork makes 256 vibrations per second in air. When the speed of sound is $330m / s$, the wavelength of the note emitted is :

A. 0.56 m

B. 0.89 m

C. 1.11 m

D. 1.29m

Answer: D

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6. A man sets his watch by a whistle that is 2 km away. How much will his watch be in error. (speed of sound in air 330 m / sec)

A. 3 seconds fast

B. 3 seconds slow

C. 6 seconds fast

D. 6 seconds slow

Answer: D

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7. When a sound wave of frequency 300 Hz passes through a medium the maximum displacement of a particle of the medium is 0.1 cm . The maximum velocity of the particle is equal to

A. $60\pi cm / \sec$

B. $30\pi cm / \sec$

C. $30 cm / \sec$

D. $60 cm / \sec$

Answer: A

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8. Sound waves have the following frequencies that are audible to human beings

A. 5c/s

B. 27000 c/s

C. 5000 c/s

D. 50, 000 c/s

Answer: C

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9. 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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10. Wavelength of ultrasonic waves in air is of the order of :

A. $5 \times 10^{-5} cm$

B. $5 \times 10^{-8} cm$

C. $5 \times 10^{5} cm$

D. $5 \times 10^{8} cm$

Answer: A

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11. The phase difference corresponding to path difference of x is

A. $\Delta\phi = \frac{2\pi}{\lambda}\Delta x$

B. $\Delta\phi = 2\pi\lambda\Delta x$

C. $\Delta\phi = \frac{2\pi\lambda}{\Delta x}$

D. $\Delta\phi = \frac{2\Delta x}{\lambda}$

Answer: A

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12. 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. $4 \times 10^{-4}m$

B. $8 \times 10^{-3}m$

C. $4 \times 10_{-3}m$

D. 8×10^{-4} m

Answer: A

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13. The minimum audible wavelength at room temperature is about

A. 0.2Å

B. 5Å

C. 5 cm to 2 metre

D. 20 mm

Answer: D

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14. The ratio of the speed of sound in nitrogen gas to that in helium gas, at 300K is

A. $\sqrt{2/7}$

B. $\sqrt{1/7}$

C. $\sqrt{3}/5$

D. $\sqrt{6}/5$

Answer: C

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15. In a sinusoidal wave, the time required for a particular point to move from maximum displacement to zero displacement is 0.170 second. 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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16. The number of waves contained in unit length of the medium is called

A. Elastic wave

B. Wave number

C. Wave pulse

D. Electromagnetic wave

Answer: B

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17. The frequency of a rod is 200 HZ. If the velocity of sound in air is $340ms^{-1}$, the wavelength of the sound produced is

A. 1.7 cm

B. 6.8 m

C. 1.7 m

D. 13.6 m

Answer: C

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18. What is the audible range of the average human ear ?

A. 0 Hz-30 Hz

B. 20 Hz- 20 kHz

C. 20 kHz - 20,000 kHz

D. 20 kHz- 20 MHz

Answer: B

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19. In a medium sound travels 2 km in 3 sec and in air, it travel 3 km in 10 sec . The ratio of the wavelengths of sound in the two media is

A. $1:8$

B. $1:18$

C. $8:1$

D. $20:9$

Answer: D

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20. 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. 11.5 seconds

B. 21 seconds

C. 10 seconds

D. 14 seconds

Answer: A

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21. When sound waves travel from air to water, which of the following remains constant

A. Velocity

B. Frequency

C. Wavelength

D. All the above

Answer: B

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22. A stone is dropped in a well which is 19.6 m deep. Echo sound is heard after 2.06 sec (after dropping) then the velocity of sound is

A. 332.6 m/sec

B. 326.7 m/sec

C. 300.4 m/sec

D. 290.5 m/sec

Answer: B

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23. At what temperature will the speed of sound be double of its value at $0^{\circ} C$?

A. 819 k

B. 819° C

C. 600° C

D. 600 K

Answer: B

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24. Velocity of sound is maximum in

A. Air

B. Water

C. Vacuum

D. Steel

Answer: D

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25. If velocity of sound in a gas is 360 m / s and the distance between a compression and the nearest rarefaction is 1 m , then the frequency of sound is

A. 90 Hz

B. 180 Hz

C. 360 Hz

D. 720 Hz

Answer: B

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26. If the density of oxygen is 16 times that of hydrogen, what will be the ratio of their corresponding velocities of sound waves

A. $1:4$

B. $4:1$

C. $16:1$

D. $1:16$

Answer: A

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27. At which temperature the speed of sound in hydrogen will be same as that of speed of sound in oxygen at $100^{\circ}C$

A. $-148^{\circ}C$

B. $-212.5^{\circ}C$

C. $317.5^{\circ}C$

D. $-249.7^{\circ}C$

Answer: D

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28. A tuning fork produces waves in a medium. If the temperature of the medium changes, then which of the following will change

A. Amplitude

B. Frequency

C. Wavelength

D. Time-period

Answer: C

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29. The wave length of light in visible part (λ_v) and for sound (λ_s) are related as

A. $\lambda_v > \lambda_s$

B. $\lambda_s > \lambda_v$

C. $\lambda_v = \lambda_s$

D. None of these

Answer: B

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30. Which of the following is different from others

A. Velocity

B. Wavelength

C. Frequency

D. Amplitude

Answer: D

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31. The phase difference between two points separated by 1m in a wave of frequency 120 Hz is 90° . The wave velocity is

A. 180 m/s

B. 240 m/s

C. 480 m/s

D. 720 m/s

Answer: C

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32. The echo of a gun shot is heard 8 sec. after the gun is fired. How far from him is the surface that reflects the sound (velocity of sound in air = 350 m/s)

A. 1400 m

B. 2800 m

C. 700 m

D. 350 m

Answer: A

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33. A man sets his watch by the sound of a siren placed at a distance 1 km away . If the velocity of sound is $330m/s$

A. His watch is set 3 sec. faster

B. His watch is set 3 sec. slower

C. His watch is set correctly

D. None of these

Answer: B

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34. Velocity of sound in air is

A. Faster in dry air than in moist air

B. Directly proportional to pressure

C. Directly proportional to temperature

D. Independent of pressure of air

Answer: D

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35. Two monoatomic ideal gases 1 and 2 of molecular masses m_1 and m_2 respectively are enclosed in separate containers kept at the same temperature. The ratio of the of sound in gas 1 to that in gas 2 is given by

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

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

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

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

Answer: B

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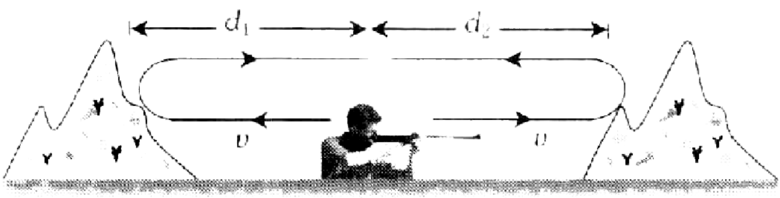
36. A man is standing between two parallel cliffs and fires a gun. If he hears first and second echoes after 1.5 s and 3.5s respectively, the distance between the cliffs is (Velocity of sound in air $= 340ms^{-1}$)



A. 1190 m

B. 850 m

C. 595 m

D. 510 m

Answer: B

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37. When the temperature of an ideal gas is increased by 600 K , the velocity of sound in the gas becomes $\sqrt{3}$ times the initial velocity in it. The initial temperature of the gas is

A. $-73^{\circ} C$

B. $27^{\circ} C$

C. $127^{\circ} C$

D. $327^{\circ} C$

Answer: B

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38. The frequency of a sound wave is n and its velocity is v. If the frequency is increased to 4n the velocity of the wave will be

A. v

B. 2v

C. 4v

D. $v/4$

Answer: A

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39. The temperature at which the speed of sound in air becomes double of its value at $27^{\circ}C$ is

A. $54^{\circ}C$

B. $327^\circ C$

C. $927^\circ C$

D. -123° C

Answer: C

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40. The speed of a wave in a certain medium is $960m/s$. If 3600 waves pass over a certain point of the medium in 1 min, the wavelength is

A. 2 metres

B. 4 metres

C. 8 metres

D. 16 metres

Answer: D

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41. Speed of sound at constant temperature depends on

A. Pressure

B. Density of gas

C. Above both

D. None of the above

Answer: D

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42. A man standing on a cliff claps his hand hears its echo after 1 sec . If sound is reflected from another mountain and velocity of sound in air is 340 m / sec . Then the distance between the man and reflection point is

A. 680 m

B. 340 m

C. 85 m

D. 170 m

Answer: D

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43. What will be the wave velocity, if the radar gives 54 waves per min and wavelength of the given wave is 10 m

A. $4/\sec$

B. $6m/\sec$

C. $9m/\sec$

D. $5m/\sec$

Answer: C

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44. Sound velocity is maximum in

A. H_2

B. N_2

C. He

D. O_2

Answer: A

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45. What is the minimum distance of the obstacle from the source of sound for hearing distinct echo ?

A. 28 m

B. 18 m

C. 19 m

D. 16.5 m

Answer: D

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46. The type of waves that can be propagated through solid is

A. Transverse

B. Longitudinal

C. Both (a) and (b)

D. None of these

Answer: C

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47. A man stands in front of a hillock and fires a gun. He hears an echo after 1.5 sec . The distance of the hillock from the man is (velocity of sound in air is 330 m/s)

A. 220 m

B. 247.5 m

C. 268.5 m

D. 292.5 m

Answer: B

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48. Velocity of sound in air

I. Increases with temperature

II. Decreases with temperature

III. Increase with pressure

IV. Is independent of pressure

V. Is independent of temperature Choose the correct answer

A. Only I and II are true

B. Only I and III are true

C. Only II and III are true

D. Only I and IV are true

Answer: D

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49. 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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50. If at same temperature and pressure, the densities for two diatomic gases are respectively d_1 and d_2 , then the ratio of velocities of sound in these gases will be

A. $\sqrt{\frac{d_2}{d_1}}$

B. $\sqrt{\frac{d_1}{d_2}}$

C. $d_1 d_2$

D. $\sqrt{d_1 d_2}$

Answer: A

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51. The frequency of a tunning fork is 384 per second and velocity of sound in air is 352 m/s . How far the sound has traversed while fork completes 36 vibration

A. 3 m

B. 13 m

C. 23 m

D. 33 m

Answer: D

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52. v_1 and v_2 are the velocities of sound at the same temperature in two monoatomic gases of densities `

A. $1:2$

B. $4:1$

C. $2:1$

D. $1:4$

Answer: C

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53. The temperature at which the speed of sound in air becomes double of its value at $0^\circ C$ is

A. 273 K

B. 546 K

C. 1092 K

D. 0 K

Answer: C

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54. If wavelength of a wave is $\lambda = 6000\text{Å}$.Then wave number will be

A. 166×10^3 m

B. 16.6×10^{-1} m

C. 1.66×10^6 m

D. 1.66×10^7 m

Answer: C

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55. Velocity of sound measured in hydrogen and oxygen gas at a given temperature will be in the ratio

A. $1:4$

B. $4:1$

C. $2:1$

D. $1:1$

Answer: B

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56. Find the frequency of minimum distance between compression & rarefaction of a wire. If the length of the wire is 1 m & velocity of sound in air is 360 m/s

A. 90 sec

B. 180 s

C. 120 sec

D. 360 sec

Answer: A

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57. The velocity of sound is v_s in air. If the density of air is increased to 4 times, then the new velocity of sound will be

A. $\dfrac{v_s}{2}$

B. $\dfrac{v_s}{12}$

C. $12v_s$

D. $\dfrac{3}{2}v_s^2$

Answer: A

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58. It takes 2.0 seconds for a sound wave to travel between two fixed points when the day temperature is $10^{\circ} C$. If the temperature rise to $30^{\circ} C$ the sound wave travels between the same fixed parts in

A. 1.9 sec

B. 2.0 sec

C. 2.1 sec

D. 2.2 sec

Answer: A

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59. If v_m is the velocity of sound in moist air, v_d is the velocity of sound in dry air, under identical conditions of pressure and temperature

A. $V_m > V_d$

B. $V_m < V_d$

C. $V_m = V_d$

D. $V_m V_d = 1$

Answer: A

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60. A man standing between two parallel hills, claps his hand and hears successive echoes at regular intervals of 1s. If velocity of sound is 340 m s^{-1}, then the distance between the hills is

A. 340 m

B. 1620 m

C. 680 m

D. 1700 m

Answer: A

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61. 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 sounds recorded by an observer who is standing in air is :-

A. 200 Hz

B. 3000 Hz

C. 120 Hz

D. 600 Hz

Answer: D

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62. If the temperature of the atmosphere is increased the following character of the sound wave is effected

A. Amplitude

B. Frequency

C. Velocity

D. Wavelength

Answer: C

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63. An underwater sonar source operating at a frequency of 60 kHz directs its beam towards the surface. If velocity of sound in air is 330 m/s, wavelength and frequency of the waves in air are :-

A. 5.5 mm , 60 KHz

B. 330 m, 60 KHz

C. 5.5 mm , 20 KHz

D. 5.5 mm , 80 KHz

Answer: A

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64. Two sound waves have phase difference of 60°, then they will have the path difference of:

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65. It is possible to distinguish between the transverse and longitudinal waves by studying the property of

A. Interference

B. Diffraction

C. Reflection

D. Reflection

Answer: D

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66. Water waves are

A. Longitudinal

B. Transverse

C. Both longitudinal and transverse

D. Both longitudinal and transverse

Answer: C

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67. Sound travels in rocks in the form of :

A. Longitudinal elastic waves only

B. Transverse elastic waves only

C. Both longitudinal and transverse elastic waves

D. Non-elastic waves

Answer: C

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68. The waves in which the particles of the medium vibrate in a direction perpendicular to the direction of wave motion is known as

A. Transverse wave

B. Longitudinal waves

C. Propagated waves

D. None of these

Answer: A

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69. A medium can carry a longitudinal wave because it has the property

A. Mass

B. Density

C. Compressibility

D. Elasticity

Answer: D

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70. Which of the following is the longitudinal wave

A. Sound waves

B. Waves on plucked string

C. Water waves

D. Light waves

Answer: A

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71. The nature of sound waves in gases is

A. Transverse

B. Longitudinal

C. Stationary

D. Electromagnetic

Answer: B

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72. Transverse waves can propagate in

A. Liquids

B. Solids

C. Gases

D. None of these

Answer: B

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73. Sound waves in air are

A. Transverse

B. Longitudinal

C. De-Broglie waves

D. All the above

Answer: B

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74. Which of the following is not the transverse wave

A. X-rays

B. y-rays

C. Visible light wave

D. Sound wave in a gas

Answer: D

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75. What is the phase difference between two successive crests in the wave

A. π

B. $\pi / 2$

C. 2π

D. 4π

Answer: C

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76. A wave of frequency 500 Hz has velocity 360 m/sec. The distance between two nearest points 60° out of phase, is

A. 0.6 cm

B. 12 cm

C. 60 cm

D. 120 cm

Answer: B

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77. A wave of frequency 500 Hz has velocity 360 m/sec. The distance between two nearest points 60° out of phase, is

A. Refraction

B. Interference

C. Diffraction

D. Polarisation

Answer: D

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78. When an aeroplane attains a speed higher than the velocity of sound in air, a loud bang is heard. This is because

A. It explodes

B. It produces a shock wave which is received as the bang

C. Its wings vibrate so violently that the bang is heard

D. The normal engine noises undergo a Doppler shift to generate the bang

Answer: B

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79. Ultrasound waves are those waves :

A. To which man can hear

B. Man can't hear

C. Are of high velocity

D. Of high amplitude

Answer: B

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80. A big explosion on the moon cannot be heard on the earth because

A. The explosion produces high frequency sound waves which are inaudible

B. Sound waves required a material medium for propagation

C. Sound waves are absorbed in the moon's atmosp

D. Sound waves are absorbed in the earth's atmosphere

Answer: B

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81. Sound waves of wavelength greater than that of audible sound are called

A. Seismic waves

B. Sonic waves

C. Ultrasonic waves

D. Infrasonic waves

Answer: D

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82. 'SONAR' emits which of the following waves

A. Radio waves

B. Ultrasonic waves

C. Light waves

D. Magnetic waves

Answer: B

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83. Which type of waves do not require a material medium for propagation?

A. Cathode ray

B. Electromagnetic wave

C. Sound wave

D. None of the above

Answer: B

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84. Consider the following

I. Waves created on the surfaces of a water pond by a vibrating sources.

II. Wave created by an oscillating electric field in air.

III. Sound waves travelling under water. Which of these can be polarized

A. I and II

B. II only

C. II and III

D. I, II and III

Answer: B

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85. Mechanical waves on the surface of a liquid are

A. Transverse

B. Longitudinal

C. Torsional

D. Both transverse and longitudinal

Answer: D

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86. The ratio of densities of oxygen and nitrogen is 16 : 14. At what temperature, the speed of sound in oxygen will be equal to its speed in nitrogen at $14^{\circ} C$?

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87. The intensity of sound increases at night due to

A. Increase in density of air

B. Decreases in density of air

C. Low temperature

D. None of these

Answer: A

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88. A wave of wavelength 0.60 cm is produced in air and it travels at a speed of$300 ms^{-1}$. Will it be audible?

A. Audible wave

B. Infrasonic wave

C. Ultrasonic wave

D. None of the above

Answer: C

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89. Speed of sound in mercury at a certain temperature is 1450 m/s . Given the density of mercury as $13.6 \times 10^3 kg/m$, the bulk modulus for mercury is

A. $2.86 \times 10^{10} N/m$

B. $3.86 \times 10^{10} N/m$

C. $4.86 \times 10^{10} N/m$

D. $5.86 \times C^{10} N/m$

Answer: A

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90. A micro-wave and an ultrasonic sound wave have the same wavelength. Their frequencies are in the ratio (approximately)

A. $10^6 : 1$

B. $10^4 : 1$

C. $10^2 : 1$

D. $10 : 1$

Answer: A

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91. 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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92. A wave has velocity u in medium P and velocity 2 u in medium Q . If the wave is incident in medium P at an angle of 30° then the angle of refraction will be

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D

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93. An observer standing at the sea coast observes $54 waves$ reaching the coast per minute. If the wavelength of a wave is $10m$, find the wave velocity.

A. 540 ms

B. 5.4 ms

C. 0.184 ms

D. 9 ms

Answer: D

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94. Ultrasonic signal sent from SONAR returns to it after reflection from a rock after a lapse of 1 sec. If the velocity of ultrasound in water is 1600 ms^{-1}, the depth of the rock in water is

A. 300 m

B. 400 m

C. 500 m

D. 800 m

Answer: D

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Progressive Waves

1. The equation of a wave is $y=2\sin\pi(0.5x-200t)$. Where x and y are expressed in cm and t in sec. The wave velocity is

A. 100 cm /sec

B. 200 cm / sec

C. 300 cm sec

D. 400 cm / sec

Answer: D

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2. Equation of a progressive wave is given by

$$y=0.2\cos\pi\left(0.04t+.02x-\frac{\pi}{6}\right)$$

The distance is expressed in cm and time in second. What will be the minimum distance between two particles having the phase difference of $\pi / 2$

A. 4 cm

B. 8 cm

C. 25 cm

D. 12.5 cm

Answer: C

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3. A travelling wave passes a point of observation. At this point, the time interval between successive crests is 0.2 seconds and

A. The wavelength is 5 m

B. The frequency is 5 Hz

C. The velocity of propagation is 5 m / s

D. The wavelength is 0.2 m

Answer: B

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4. The equation of a transverse wave is given by

$$y = 10\sin\pi(0.01x - 2t)$$

where x and y are in cm and t is in second. Its frequency is

A. $10\sec^{-1}$

B. $2\sec^{-1}$

C. $1\sec^{-1}$

D. $0.01\sec^{-1}$

Answer: C

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5. At a moment in a progressive wave , the phase of a particle executing S. H. M $\frac{\pi}{3}$. Then the phase of the particle 15 cm ahead and at the time $\frac{T}{2}$ will be , if the wavelength is 60 cm

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

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

C. zero

D. $\frac{5\pi}{6}$

Answer: D

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6. The equetion of a wave travelling on a string is

$$y = 4\frac{\sin(\pi)}{2}\left(8t - \frac{x}{8}\right)$$

if x and y are in centimetres, then velocity of waves is

A. 64 cm/sec in - x direction

B. 32 cm/sec in - x direction

C. 32 cm/sec in + x direction

D. 64 cm/sec in + x direction

Answer: D

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7. The equation of a progressive wave is given by

$y = a \sin(628t - 31.4x)$

If the distances are expressed in cms and time in seconds, then the wave velocity will be

A. 314 cm/sec

B. 628 cm/sec

C. 20 cm/sec

D. 400 cm/sec

Answer: C

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8. Two waves are given by $y_1 = a\sin(\omega t - kx)$ and $y_2 = a\cos(\omega t - kx)$. The phase difference between the two waves is

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

B. π

C. $\frac{\pi}{8}$

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

Answer: D

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9. If the amplitude of a wave at a distance r from a point source is A, the amplitude at a distance $2r$ will be

A. 2A

B. A

C. A/2

D. A/4

Answer: C

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10. The relation between time and displacement for two particles is given by

$y = 0.06 \sin 2\pi(0.04t + \phi_1), y_2 = 0.03 \sin 2\pi(1.04t + \phi_2)$

The ratio of the intensities of the waves produced by the vibrations of the two particles will be

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Answer: C

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11. A wave is reflected from a rigid support. The change in phase on reflection will be

A. $\pi/4$

B. $\pi/2$

C. π

D. 2π

Answer: C

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12. A plane wave is represented by

$x = 1.2 \sin(314t + 12.56y)$

Where x and y are distances measured along in x and y direction in meters and t is time in seconds. This wave has

A. A wavelength of 0.25 m and travels in + ve x direction

B. A wavelength of 0.25 m and travels in + ve y direction

C. A wavelength of 0.25 m and travels in - ve y direction

D. A wavelength of 0.25 m and travels in - ve x direction

Answer: C

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13. The displacement y (in cm) produced by a simple harmonic wave is $y = \frac{10}{\pi}\sin\left(2000\pi t - \frac{\pi x}{17}\right)$. The periodic time and maximum velocity of the particles in the medium will respectively be

A. 10^{-3} sec and 330 m/sec

B. 10^{-4} sec and 20 m/sec

C. 10^{-3} sec and 200 m/sec

D. 10^{-2} sec and 2000 m/sec

Answer: C

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

A. 100 cm /sec

B. 2 cm

C. 5 cm to 2 metre

D. None of the these

Answer: B

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15. A travelling wave is described by the equation $y = y_0 \sin\left(\left(ft - \frac{x}{\lambda}\right)\right)$. The maximum particle velocity is equal to four times the wave velocity if

A. $\lambda = \frac{\pi Y_0}{4}$

B. $\lambda = \frac{\pi Y_0}{2}$

C. $\lambda = \pi Y_0$

D. $\lambda = 2\pi Y_0$

Answer: B

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16. A wave equation which gives the displacement along the y direction is given by $y = 10^{-4} \sin(60t + 2x)$, where x and y are in meters and t is time in seconds This represents a wave

A. Travelling with a velocity of 30 m/sec in the negative X direction

B. Of wavelength π metre

C. Of frequency $30 / \pi Hz$

D. Of amplitude 10^{4} metre travelling along the negative X direction

Answer: A::B::C::D

Watch Video Solution

17. A transverse wave of amplitude $0.5m$ and wavelength 1 m and frequency 2 Hz is propagating in a string in the negative x - direction. The expression for this wave is

A. $y(x, t) = 0.5\sin(2\pi x - 4\pi t)$

B. $y(x, t) = 0.5\cos(2\pi x + 4\pi t)$

C. $y(x, t) = 0.5\sin(\pi x - 2\pi t)$

D. $y(x, t) = 0.5\cos(2\pi x + 2\pi t)$

Answer: B

Watch Video Solution

18. The displacement of a particle is given by $y = 5 \times 10^{-4}\sin(100t - 50x)$, where x is in meter and t in sec, find out the velocity of the wave

A. 5000 m/sec

B. 1 m/sec

C. 0.5 m/sec

D. 300 m/sec

Answer: B

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19. Which one of the following does not represent a travelling wave?

A. $y = \sin(x - vt)$

B. $y = y_m \sin k(x + vt)$

C. $y = y_m \log(x - vt)$

D. $y = f(x^2 - vt^2)$

Answer: D

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20. A wave is represented by the equation

$$y = A\sin\left(10\pi x + 15\pi t + \frac{\pi}{3}\right)$$

where x is in meter and t is in seconds. The expression represents :

A. A wave travelling in the positive X direction with a velocity of 1.5 m / sec

B. A wave travelling in the negative X direction with a velocity of 1.5 m / sec

C. A wave travelling in the negative X direction with a wavelength of 0.2 m

D. A wave travelling in the positive X direction with a wavelength of 0.2 m

Answer: B::C

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Watch Video Solution

21. A plane wave is described by the equation $y = 3\cos\left(\frac{x}{4} - 10t - \frac{\pi}{2}\right)$. The maximum velocity of the particles of the medium due to this wave is

A. 30

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

C. $3/4$

D. 40

Answer: A

Watch Video Solution

22. The path difference between the two waves

$y_1 = a_1 \sin\left(\omega t - \frac{2\pi x}{\lambda}\right)$ and $y(2) = a_2 \cos\left(\omega t - \frac{2\pi x}{\lambda} + \phi\right)$ is

A. $\frac{\lambda}{2\pi}\phi$

B. $\frac{\lambda}{2\pi}\left(\phi+\frac{\pi}{2}\right)$

C. $\frac{2\pi}{\lambda}\left(\phi-\frac{\pi}{2}\right)$

D. $\frac{2\pi}{\lambda}\phi$

Answer: B

Watch Video Solution

23. Wave equations of two particles are given by $y_1 = a\sin(\omega t - kx), y_2 = a\sin(kx + \omega t)$, then

A. They are moving in opposite direction

B. Phase between them is 90°

C. Phase between them is 180°

D. Phase between them is 0°

Answer: A

Watch Video Solution

24. A wave is represented by the equation $y = 0.5\sin(10t - x)m$. It is a travelling wave propagating along the + x direction with velocity

A. $10m/s$

B. $20m/s$

C. $5m/s$

D. None of these

Answer: A

Watch Video Solution

25. A wave is represented by the equetion

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

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

A. $175m/\sec$

B. $49\pi m/\sec$

C. $49\pi m/\sec$

D. $0.28\pi m/\sec$

Answer: A

Watch Video Solution

26. The equation of a transverse travelling on a rope is given by $y = 10\sin\pi(0.01x - 2.00t)$ where y and x are in cm and t in seconds. The maximum transverse speed of a particle in the rope is about

A. $63cm/s$

B. $75cm/s$

C. $100cm/s$

D. $121c\frac{m}{s}$

Answer: A

Watch Video Solution

27. As a wave propagates,

A. The wave intensity remains constant for a plane wave

B. The wave intensity decreases as the inverse of the distance from the source for a spherical wave

C. The wave intensity decreases as the inverse square of the distance from the source for a spherical wave

D. Total intensity of the spherical wave over the spherical surface centered at the source remains constant at all times

Answer: A::C::D

Watch Video Solution

28. 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. $\lambda = \pi y_0 / 3$

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

D. $\lambda = \pi y_0$

Answer: D

Watch Video Solution

29. A travelling wave in a stretched string is described by the equation $y = A\sin(kx - \omega t)$ the maximum particle velocity is

A. $A\omega$

B. ωk

C. $d\omega / dk$

D. x / t

Answer: A

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30. A wave travels in a medium according to the equation of displacement given by

$y(x, t) = 0.03\sin\pi(2t - 0.01x)$

where y and x are in metres and t in seconds. The wavelength of the wave is

A. 200 m

B. 100 m

C. 20 m

D. 10 m

Answer: A

Watch Video Solution

31. The particles of a medium vibrate about their mean positions whenever a wave travels through that medium. The phase difference between the vibrations of two such particles

A. Varies with time

B. Varies with distance separating them

C. Varies with time as well as distance

D. Is always zero

Answer: B

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32. A progressive wave is given by

$y = 3 \sin 2\pi[(t/0.04) - (x/0.01)]$

where x, y are in cm and t in s. The frequency of wave and maximum acceleration will be:

A. $100Hz, 4.7 \times 10^3 cm/s^2$

B. $50Hz, 7.5 \times 10^3 cm/s^2$

C. $25Hz, 4.7 \times 10^4 cm/s^2$

D. $25Hz, 7.5 \times 10^4 cm/s^2$

Answer: D

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33. 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. $v = 5m/\sec$

B. $49\pi m/\sec$

C. $a = 0.04m$

D. $n = 50Hz$

Answer: B

Watch Video Solution

34. 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 mass

D. Energy and linear momentum

Answer: D

Watch Video Solution

35. The frequency of the sinusoidal wave

$y = 0.40 \cos[2000t + 0.80x]$ would be

A. $1000\pi Hz$

B. $2000Hz$

C. $20Hz$

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

Answer: D

Watch Video Solution

36. Which of the following equations represents a wave

A. $Y = A(\omega t - kx)$

B. $Y = A \cos kx$

C. $Y = A \sin \omega t$

D. $Y = A \sin(at - bx + c)$

Answer: D

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37. The equation of a transverse wave is given by

$y = 100 \sin \pi(0.04z - 2t)$

where y and z are in cm ant t is in seconds. The frequency of the wave in Hz is

A. 1

B. 2

C. 25

D. 100

Answer: A

Watch Video Solution

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

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

B. $\frac{100}{\pi} Hz$

C. $100 Hz$

D. $50Hz$

Answer: A

Watch Video Solution

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

A. 0.2 unit

B. 0.1 unit

C. 0.3 unit

D. Cannot be calculated

Answer: B

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40. In the given progressive wave equation $y = 0.5 \sin(10\pi t - 5x)$ where x,y in cm and t in second. The maximum velocity of the particle is :

A. $5cm / s$

B. $5\pi cm / s$

C. $10cm / s$

D. $10.5cm / s$

Answer: B

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

A. The same phase as the incident pulse but with velocity reversed

B. A phase change of 180° with no reversal of velocity

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

D. A phase change of 180° with velocity reversed

Answer: D

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42. The equation of a travelling wave is

$y = 60\cos(1800t - 6x)$

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. 3.6×10^{-11}

B. 3.6×10^{-6}

C. 3.6×10^{-4}

D. 3.6

Answer: C

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43. The wave equation is $y = 0.30 \sin(314t - 1.57x)$ where t , x and y are in second, meter and centimeter respectively. The speed of the wave is

A. $100m/s$

B. $200m/s$

C. $300m/s$

D. $400m/s$

Answer: B

Watch Video Solution

44. Equation of the progressive wave is given by : $y = a \sin \pi(40t - x)$ where a and x are in metre and t in second. The velocity of the wave is

A. $80m/s$

B. $10m/s$

C. $40/s$

D. $20/s$

Answer: C

Watch Video Solution

45. Progressive wave of sound is represented by $y = a \sin[400\pi t - \pi x/6.85]$ where x is in m and t is in sec. Frequency of the wave will be

A. 200 Hz

B. 400 Hz

C. 500 Hz

D. 600 Hz

Answer: A

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46. Two waves of frequencies 20 Hz and 30 Hz. Travels out from a common point. The phase difference between them after 0.6 sec is

A. zero

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

C. π

D. $\frac{3\pi}{4}$

Answer: A

Watch Video Solution

47. The phase difference between two points separated by 0.8 m in a wave of frequency 120 Hz is 90°. Then the velocity of wave will be

A. $182m/s$

B. $360m/s$

C. $710m/s$

D. $384m/s$

Answer: D

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48. The equation of a progressive wave is

$$y = 0.02 \sin 2\pi \left[\frac{t}{0.01} - \frac{x}{0.30}\right]$$

here x and y are in metres and t is in seconds. The velocity of propagation of the wave is

A. $30m / s$

B. $40m / s$

C. $300m / s$

D. $400m / s$

Answer: A

Watch Video Solution

49. If the equation of transverse wave is $y = 5 \sin 2\pi \left[\frac{t}{0.04} - \frac{x}{40}\right]$, where distance is in cm and time in second, then the wavelength of the wave is

A. 60 cm

B. 40 cm

C. 35 cm

D. 25 cm

Answer: B

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50. A wave is represented by the equation : $y = a\sin(0.01x - 2t)$ where a and x are in cm . velocity of propagation of wave is

A. $10cm/s$

B. $50cm/s$

C. $100cm/s$

D. $200cm/s$

Answer: D

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51. A simple harmonic progressive wave is representive by the equation $y = 8\sin 2\pi(0.1x - 2t)$ where x and y are in centimetres and t is in seconds. At any instant the phase difference between two particle separted by 2.0 cm along the x-direction is

A. 18°

B. 36°

C. 54°

D. 72°

Answer: D

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52. The intensity of a progressing plane wave in loss-free medium is

A. Directly proportional to the square of amplitude of the wave

B. Directly proportional to the velocity of the wave

C. Directly proportional to the square of frequency of the wave

D. Inversely proportional to the density of the medium

Answer: A::B::C

Watch Video Solution

53. The equation of progressive wave is $y=a\sin(200t-x)$. where x is in meter and t is in second. The velocity of wave is

A. $200m/s$

B. $100m/s$

C. $50m/s$

D. None of these

Answer: A

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54. A wave is represented by the equation $y = 7\sin\{\pi(2t - 2x)\}$ here x is in metres and t in seconds. The velocity of the wave is

A. $1m/s$

B. $2m/s$

C. $5m/s$

D. $10m/s$

Answer: A

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55. The equation of a longitudinal wave is represented as $y = 20 \cos \pi (50t - x)$. Its wavelength is

A. 5 cm

B. 2 cm

C. 50 cm

D. 20 cm

Answer: B

Watch Video Solution

56. A wave equation which gives the displacement along y -direction is given by $y = 0.001 \sin(100t + x)$ where x and y are in meterand t is time in second. This represented a wave

A. Of frequency $\frac{100}{\pi} Hz$

B. Of wavelength one metre

C. Travelling with a velocity of $\frac{50}{\pi} ms^{-1}$ in the positive X -direction

D. Travelling with a velocity of $100 ms^{-1}$ in the negative X - direction

Answer: D

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57. A transverse wave is given by $y = A \sin 2\pi \left(\frac{t}{T} - \frac{x}{\lambda} \right)$. The maximum particle velocity is equal to 4 times the wave velocity when

A. $\lambda = 2\pi A$

B. $\lambda = \frac{1}{2}\pi A$

C. $\lambda = \pi A$

D. $\lambda = \frac{1}{4}\pi A$

Answer: B

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58. The equation of a wave is represented by $y = 10^{-4}\sin\left[100t - \frac{x}{10}\right]$. The velocity of the wave will be

A. $100m/s$

B. $250m/s$

C. $750m/s$

D. $1000m/s$

Answer: D

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

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

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

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

Answer: C

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60. The equation of a wave motion (with t in seconds and x in metres) is given by $y = 7 \sin\left[7\pi t - 0.4\pi x + \frac{\pi}{3}\right]$. The velocity of the wave will be

A. $17.5 m / s$

B. $49\pi m / s$

C. $\frac{40}{2\pi} m / s$

D. $\frac{2\pi}{49} m / s$

Answer: A

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61. Two waves represented by the following equations are travelling in the same medium

$y_1 = 5\sin 2\pi(75t - 0.25x), y_2 = 10\sin 2\pi(150t - 0.50x)$

The intensity ratio I_1 / I_2 of the two waves is

A. $1:2$

B. $1:4$

C. $1:8$

D. $1:16$

Answer: B

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62. The equation of a progressive wave is $y = 8\sin\left[\pi\left(\frac{t}{10} - \frac{x}{4}\right) + \frac{\pi}{3}\right]$. The wavelength of the wave is

A. 8 m

B. 4 metres

C. 2 m

D. 10 m

Answer: A

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63. Which of the following is not true for the progressive wave

$$y = 4\sin 2\pi\left(\frac{t}{0.02} - \frac{x}{100}\right)$$

where x and y are in cm and t in seconds.

A. Its amplitude is 4 cm

B. Its wavelength is 100 cm

C. Its frequency is 50 cycles/sec

D. Its propagation velocity is 50×10^3 cm /sec

Answer: D

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64. The equation of a wave is given as$y = 0.07 \sin(12\pi x - 3000\pi t)$. .

where xis in metre and t in sec, then the correct statement is

A. $\lambda = 1/6m, v = 250m/s$

B. $a = 0.07m, v = 300m/s$

C. $n = 1500, v = 200m/s$

D. None

Answer: A

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65. The equation of the propagating wave is $y = 25\sin(20t + 5x)$,where y is displacement. Which of the following statement is not true

A. The amplitude of the wave is 25 units

B. The wave is propagating in positive x -direction

C. The velocity of the wave is 4 units

D. The maximum velocity of the particles is 500 units

Answer: B

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66. In a plane progressive wave given by $y = 25\cos(2\pi t - \pi x)$, the amplitude and frequency are respectively

A. 25100

B. 25, 1

C. 25, 2

D. $50\pi, 2$

Answer: B

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67. The displacement y of a wave travelling in the x-direction is given by

$$y = 10^{-4} \sin\left(\left(600t - 2x + \frac{\pi}{3}\right) meters\right.$$

where x is expressed in meters and t in seconds. The speed of the wave-motion, in ms^{-1}, is

A. 200

B. 300

C. 600

D. 1200

Answer: B

Watch Video Solution

68. The displacement y of a partcle in a medium can be expressed as, $y = 10^{-6}\sin\left(\left(100t + 20x + \frac{\pi}{4}\right)m\right.$ where t is in second and x in meter. The speed of the wave is

A. $2000m/s$

B. $5m/s$

C. $20m/s$

D. $5\pi m/s$

Answer: B

Watch Video Solution

69. If the wave equation $y = 0.08\frac{\sin(2\pi)}{\lambda}(200t - x)$ then the velocity of the wave will be

A. $400\sqrt{2}$

B. $200\sqrt{2}$

C. 400

D. 200

Answer: D

Watch Video Solution

70. The phase difference between two points separated by 0.8 m in a wave of frequency 120 Hz is 90° . Then the velocity of wave will be

A. $720m / s$

B. $384m / s$

C. $250m / s$

D. $1m / s$

Answer: B

Watch Video Solution

71. A plane progressive wave is represented by the equation $y = 0.1 \sin\left(200pot - \frac{20\pi x}{17}\right)$ where y is displacement in m , t in second and x is distance from a fixed origin in meter . The frequency, wavelength and speed of the wave respectively are

A. $100Hz, 1.7m, 170m / s$

B. $150Hz, 2.4m, 200m / s$

C. $80Hz, 1.1m, 90m / s$

D. $120Hz, 1.25m, 207m / s$

Answer: A

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72. The equation of a progressive wave is given by $y = 0.5\sin(20x - 400t)$ where xand y are in metre and tis in second. The velocity of the wave is

A. $10m/s$

B. $20m/s$

C. $200m/s$

D. $400m/s$

Answer: B

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73. A transverse progressive wave on a stretched string has a velocity of $10ms^{-1}$ and a frequency of 100 Hz . The phase difference between two particles of the string which are $2.5cm$ apart will be

A. $\frac{\pi}{8}$

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

C. $3\pi\frac{)}{8}$

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

Answer: D

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74. A transverse sinusoidal wave of amplitude a, wavelength λ and frequency f is travelling on a stretched string. The maximum speed of any point in the string is $v/10$, where v is the speed of propagation of the wave. If $a = 10^{-3} m$ and $v = 10 ms^{-1}$, then λ and f are given by

A. $\lambda = 2\pi \times 10^{-2} m$

B. $\lambda = 10^{-3} m$

C. $n = \frac{(10)^3}{2\pi} Hz$

D. $n = 10^4 Hz$

Answer: A::C

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75. When a longitudinal wave propagates through a medium, the particles of the medium execute simple harmonic oscillations about their mean positions. These oscillations of a particle are characterised by an invariant

A. Kinetic energy

B. Potential energy

C. Sum of kinetic energy and potential energy

D. Difference between kinetic energy and potential energy

Answer: C

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76. Equation of a progressive wave is given by $y = a \sin \pi \left[\frac{t}{2} - \frac{x}{4}\right]$, where t is in seconds and x is in meters. The distance through which the wave moves in 8 sec is (in meter)

A. 8

B. 16

C. 2

D. 4

Answer: B

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77. The phase difference between two waves represented by $y_1 = 10^{-6}\sin[100t + (x/50) + 0.5]m$, $y_2 = 10^{-6}\cos[100t + (x/50)]m$ where x is expressed in metres and t is expressed in seconds, is approximately

A. $1.5rad$

B. $1.07rad$

C. $2.07rad$

D. $0.5rad$

Answer: B

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78. Equation of motion in the same direction are given by ltbygt

$y_1 = 2a\sin(\omega t - kx)$ and $y_2 = 2a\sin(\omega t - kx - \theta)$

The amplitude of the medium particle will be

A. $2a\cos\theta$

B. $\sqrt{2a}\cos\theta$

C. $4a\cos\theta / 2$

D. $\sqrt{2a}\cos\theta / 2$

Answer: C

Watch Video Solution

79. A particle on the trough of a wave at any instant will come to the mean position after a time (T = time period)

A. $T / 2$

B. $T / 4$

C. T

D. 2T

Answer: B

Watch Video Solution

80. If the equation of transverse wave is $Y = 2\sin(kx - 2t)$, then the maximum particle velocity is

A. 4 units

B. 2 units

C. 0

D. 6 units

Answer: A

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Interference and Superposition of Waves

1. There is a destructive interference between the two waves of wavelength λ coming from two different paths at a point. To get maximum sound or constructive interference at that point, the path of one wave is to be increased by

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

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

C. $\frac{3\lambda}{4}$

D. λ

Answer: B

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2. When two sound waves with a phase difference of $\pi/2$, and each having amplitude A and frequency ω , are superimposed on each other, then the maximum amplitude and frequency of resultant wave is

A. $\dfrac{A}{\sqrt{2}}:\dfrac{\omega}{2}$

B. $\dfrac{A}{\sqrt{2}}:\omega$

C. $\sqrt{2}A:\dfrac{\omega}{2}$

D. $\sqrt{2}A:\omega$

Answer: D

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3. If the phase difference between the two wave is 2π during superposition, then the resultant amplitude is

A. Maximum

B. Minimum

C. Maximum or minimum

D. None of the above

Answer: A

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4. The superposition takes place between two waves of frequency f and amplitude a . The total intensity is directly proportional to

A. a

B. 2a

C. a^2

D. $4a^2$

Answer: D

Watch Video Solution

5. If two waves of same frequency and same amplitude superimpose and produce third wave of same amplitude, then waves differ in phase by –

A. π

B. $2\pi / 3$

C. $\pi / 2$

D. zero

Answer: B

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6. Two sources of sound A and B produces the wave of $350Hz$. They vibrate in the same phase. The particel P is vibrating under the influence of these two waves, if the amplitudes at the point P produced by the two waves is $0.3mm$ and $0.4mm$ then the resultant amplitude of the point P will be when $AP - BP = 25cm$ and the velocity of sound is $350m/\text{sec}$.

A. $0.7mm$

B. $0.1mm$

C. $0.2mm$

D. $0.5mm$

Answer: D

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7. Two waves are propagating to the point P along a straight line produced by two sources A and B of simple harmonic and of equal frequency. The amplitude of every wave at P is a and the phase of A is ahead by $\pi/3$ than that of B and the distance AP is greater than BP by $50cm$. Then the resultant amplitude at the point P will be if the wavelength 1 meter

A. $2a$

B. $a\sqrt{3}$

C. $a\sqrt{2}$

D. a

Answer: D

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8. Coherent sources are characterized by the same

A. Phase and phase velocity

B. Wavelength, amplitude and phase velocity

C. Wavelength, amplitude and frequency

D. Wavelength and phase

Answer: B::C

Watch Video Solution

9. The minimum intensity of sound is zero at a point due to two sources of nearly equal frequencie4s when

A. Two sources are vibrating in opposite phase

B. The amplitude of two sources are equal

C. At the point of observation, the amplitudes of two S.H.M. produced by two sources are equal and both the S.H.M. are along the same straight line

D. Both the sources are in the same phase

Answer: C

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10. Two sound waves (expressed in CGS units) given by $y_1 = 0.3\frac{\sin(2\pi)}{\lambda}(vt - x)$ and $y_2 = 0.4\frac{\sin(2\pi)}{\lambda}(vt - x + \theta)$ interfere. The resultant amplitude at a place where phase difference is $\pi/2$ will be

A. $0.7cm$

B. $0.1cm$

C. $0.5cm$

D. $\frac{1}{10}\sqrt{7}cm$

Answer: C

Watch Video Solution

11. If two waves having amplitudes 2 A and A and same frequency and velocity, propagate in the same direction in the same phase, the resulting amplitude will be

A. $3A$

B. $\sqrt{5}A$

C. $\sqrt{2}A$

D. A

Answer: A

Watch Video Solution

12. The intensity ratio of two waves is $1:16$. The ratio of their amplitudes is (Assuming medium and frequency is same)

A. $1:16$

B. $1:4$

C. $4:1$

D. $2:1$

Answer: B

Watch Video Solution

13. Out of given four waves (1),(2),(3) and (4)

$y = a\sin(kx + \omega t)$.(1)

$y = a\sin(\omega t - kx)$ ..(2)

$y = a\cos(kx + \omega t)$ ..(3)

$y = a\cos(\omega t - kx)$.(4)

emitted by four different source S_1,S_2,S_3 and S_4 respectively, interference phenomena would be observed in space under appropriate conditions when

A. Source S_1 emits wave (1) and S_2 emits wave (2)

B. Source S_3 emits wave (3) and S_4 emits wave (4)

C. Source S_2 emits wave (2) and S_4 emits wave (4)

D. S_4 emits waves (4) and S_3 emits waves (3)

Answer: C

Watch Video Solution

14. Two waves of same frequency and intensity superimpose with each other in opposite phases, then after superposition the

A. Intensity increases by 4 times

B. Intensity increases by two times

C. Varies with time as well as distance

D. None of these

Answer: D

Watch Video Solution

15. The superposing waves are represented by the following equations :

$y_1 5 \sin 2\pi(10t - 0.1x), y_2 = 10 \sin 2\pi(20t - 0.2x)$ Ratio of intensities $\frac{I_{\max}}{I_{\min}}$ will be

A. 1

B. 9

C. 4

D. 16

Answer: B

Watch Video Solution

16. The displacement of a particle is given by $x = 3\sin(5\pi t) + 4\cos(5\pi t)$. The amplitude of particle is

A. 3

B. 4

C. 5

D. 7

Answer: C

Watch Video Solution

17. Two waves $y_1 = A_1\sin(\omega t - \beta_1), y_2 = A_2\sin(\omega t - \beta_2)$ Superimpose to form a resultant wave whose amplitude is

A. $\sqrt{A_1^2 + A_2^2 + 2A_1A_2\cos(\beta_1 - \beta_2)}$

B. $\sqrt{A_1^2 + A_2^2 + 2A_1A_2\sin(\beta_1 - \beta_2)}$

C. $A_1 + A_2$

D. $|A_1 + A_2|$

Answer: A

Watch Video Solution

18. If the ratio of amplitude of wave is $2:1$, then the ratio of maximum and minimum intensity is

A. $9:1$

B. $1:9$

C. $4:1$

D. $1:4$

Answer: A

Watch Video Solution

19. The two interfering waves have intensities in the ratio $9:4$. The ratio of intensities of maxima and minima in the interference pattern will be

A. $1:25$

B. $25:1$

C. $9:4$

D. $4:9$

Answer: B

Watch Video Solution

20. If the ratio of amplitude of two waves is $4:3$, then the ratio of maximum and minimum intensity is

A. $16:18$

B. $18:16$

C. $49:1$

D. $1:49$

Answer: C

Watch Video Solution

21. Equation of motion in the same direction is given by $y_1 = A\sin(\omega t - kx)$, $y_2 = A\sin(\omega t - kx - \theta)$. The amplitude of the medium particle will be

A. $2A\cos\left(\frac{\theta}{2}\right)$

B. $2A\cos\theta$

C. $\sqrt{2}A\cos\left(\frac{\theta}{2}\right)$

D. $1.2f,\ 1.2\lambda$

Answer: A

Watch Video Solution

22. The intensity ratio of two waves is $9:1$. If they produce interference, the ratio of maximum to minimum intensity will be

A. $2:1$

B. $4:1$

C. $9:1$

D. $10:8$

Answer: B

Watch Video Solution

23. The displacements of two intering lightwaves are $y_1 = 4\sin\omega t$ and $y_2 = 3\cos(\omega t)$. The amplitude of the resultant wave is (y_1 and y_2 are in CGS system)

A. 5

B. 7

C. 1

D. 0

Answer: A

Watch Video Solution

24. Two waves are represented by $y_1 = a\sin\left(\omega t + \frac{\pi}{6}\right)$ and $y_2 = a\cos\omega t$. What will be their resultant amplitude

A. a

B. $\sqrt{2}a$

C. $\sqrt{3}a$

D. 2a

Answer: C

Watch Video Solution

25. The amplitude of a wave represented by displacement equation $y = \frac{1}{\sqrt{a}}\sin\omega t \pm \frac{1}{\sqrt{b}}\cos\omega t$ will be

A. $\frac{a+b}{ab}$

B. $\frac{\sqrt{a}+\sqrt{b}}{ab}$

C. $\frac{\sqrt{a}\pm\sqrt{b}}{ab}$

D. $\sqrt{\frac{a+b}{ab}}$

Answer: D

Watch Video Solution

26. Two waves having equaitons

$x_1 = a \sin(\omega t + \phi_1)$,$x = a \sin(\omega t + \phi_2)$

If in the resultant wave the frequency and amplitude remain equal to those of superimposing waves. Then phase difference between them is

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

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

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

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

Answer: B

Watch Video Solution

Beats

1. Two tuning forks when sounded together produced $4 beats / \sec.$ The frequency of one fork is 256. The number of beats heard increases when the fork of frequency 256 is loaded with wax. The frequency of the other fork is

A. 504

B. 520

C. 260

D. 252

Answer: C

Watch Video Solution

2. Beats are the result of

A. Diffraction

B. Destructive interference

C. Constructive and destructive interference

D. Superposition of two waves of nearly equal frequency

Answer: D

Watch Video Solution

3. Two adjacent piano keys are struck simultaneously. The notes emitted by them have frequencies n_1 and n_2. The number of beats heard per second is

A. $\frac{1}{2}(n_1 - n_2)$

B. $\frac{1}{2}(n_1 + n_2)$

C. n_1~n_2

D. $2(n_1 - n_2)$

Answer: C

Watch Video Solution

4. A tuning fork of frequency 100 when sounded together with another tuning fork of unknown frequency produces 2 beats per second. On loading the tuning fork whose frequency is not known and sounded together with a tuning fork of frequency 100 produces one beat, then the frequency of the other tuning fork is

A. 102

B. 98

C. 99

D. 101

Answer: A

Watch Video Solution

5. A tuning fork sounded together with a tuning fork of frequency 256 emits two beats. On loading the tuning fork of frequency 256, the number of beats heard are 1 per second. The frequency of tuning fork is

A. 257

B. 258

C. 256

D. 254

Answer: D

Watch Video Solution

6. If two tuning fork A and B are sounded together they produce 4 beats per second. A is then slightly loaded with wax, they produce 2 beats when sounded again. The frequency of A is 256. The frequency of B will be

A. 250

B. 252

C. 260

D. 262

Answer: B

Watch Video Solution

7. The frequencies of two sound sources are 256 Hz and 260 Hz, At $t = 0$ the intesinty of sound is maximum. Then the phase difference at the time $t = 1/16$ sec will be

A. Zero

B. π

C. $\pi / 2$

D. $\pi / 4$

Answer: C

Watch Video Solution

8. Two tuning forks have frequencies 450 Hz and 454 Hz respectively. On sounding these forks together, the time interval between successive maximum intensities will be

A. $1 / 4 \sec$

B. $1 / 2 \sec$

C. $1 \sec$

D. $2 \sec$

Answer: A

Watch Video Solution

9. When a tuning fork of frequency 341 is sounded with another tuning fork, six beats per second are heard. When the second tuning fork is loaded with wax and sounded with the first fork, the number of beats is two per second. The natural frequency of the second tuning fork is

A. 334

B. 339

C. 343

D. 347

Answer: D

Watch Video Solution

10. Two tuning forks of frequencies $256Hz$ and $258Hz$ are sounded together. The time interval, between two consecutive maxima heard by an observer is

A. 2 sec

B. 0.5 sec

C. 250 sec

D. 252 sec

Answer: B

Watch Video Solution

11. A tuning fork gives 5 beats with another tuning fork of frequency 100 Hz . When the first tuning fork is loaded with wax, then the number of beats remains unchanged, then what will be the frequency of the first tuning fork

A. 95 Hz

B. 100Hz

C. 105 Hz

D. 110 Hz

Answer: C

Watch Video Solution

12. Tuning fork F_1 has a frequency of 256 Hz and it is observed to produce $6beats/\sec ond$ with another tuning fork F_2. When F_2 is loaded with wax, it still produces $6beats/\sec$ with F_1. The frequency of F_2 before loading was

A. 253 Hz

B. 262 Hz

C. 250 Hz

D. 259 Hz

Answer: B

Watch Video Solution

13. Length of a sonometer wire is either 95 cm or 100 cm. In both the cases a tuning fork produces 4 beats then the frequency of tuning fork is :-

A. 156 Hz

B. 152 Hz

C. 250 Hz

D. 259 Hz

Answer: A

Watch Video Solution

14. Two tuning forks A and B vibrating simultaneously produce $5beats/s$. Frequency of B is $512Hz$. If one arm of A is filed, the number of beats per second increases. Frequency of A is

A. 502

B. 507

C. 517

D. 522

Answer: C

Watch Video Solution

15. The beats are produced by two sound sources of same amplitude and of nearly equal frequencies. The maximum intensity of beats will be ...... that of one source

A. Same

B. Double

C. Four times

D. Eight times

Answer: C

Watch Video Solution

16. Beats are produced by two waves given by $y_1 = a \sin 2000\pi t$ and $y_2 = a \sin 2008\pi t$. The number of beats heard per second is

A. Zero

B. One

C. Four

D. Eight

Answer: C

Watch Video Solution

17. A tunig fork whose frequency as given by mufacturer is $512Hz$ is being tested with an accurate oscillator it is found that the fork produces a beat of 2 Hz when oscillator reads 514 Hz but produces a beat of 6 Hz when oscillator reads 510 Hz. The actual frequency of fork is

A. 508 Hz

B. 512 Hz

C. 516 Hz

D. 518 Hz

Answer: C

Watch Video Solution

18. A tuning fork of frequency 480 Hz produces 10 beats per second when sounded with a vibrating sonometer string. What must have been the frequency of the string if a slight increase in tension produces lesser beats per second than before

A. 460 Hz

B. 470 Hz

C. 480 Hz

D. 490 Hz

Answer: B

Watch Video Solution

19. When a tuning fork A of unknown frequency is sounded with another tuning fork B of frequency 256Hz, then 3 beats per second are observed. After that A is loaded with wax and sounded, the again 3 beats per second are observed. The frequency of the tuning fork A is

A. 250 Hz

B. 253 Hz

C. 259 Hz

D. 262 Hz

Answer: C

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. $205s^{-1}$

C. $95s^{-1}$

D. $100s^{-1}$

Answer: A

Watch Video Solution

21. When two sound waves are superimposed, beats are produced when they have

A. Different amplitudes and phases

B. Different velocities

C. Different phases

D. Different frequencies

Answer: D

Watch Video Solution

22. Two tuning forks A and B give 4 beats per second. The frequency of A is 256 Hz . On loading B slightly, we get 5 beats in 2 seconds. The frequency of B after loading is [

A. 253.5 Hz

B. 258.5 Hz

C. 260 Hz

D. 252 Hz

Answer: C

Watch Video Solution

23. A tuning fork A of frequency 200 Hz is sounded with fork B , the number of beats per second is 5. By putting some wax on A , the number of beats increases to 8. The frequency of fork B is

A. 200 Hz

B. 195 Hz

C. 192 Hz

D. 205 Hz

Answer: D

Watch Video Solution

24. Two tuning forks A and B give $4beats/s$ when sounded together . The frequency of $Ais320Hz$. When some wax is added to B and it is sounded with $A, 4beats/sper\sec ond$ are again heard . The frequency of B is

A. 312 Hz

B. 316 Hz

C. 324 Hz

D. 328 Hz

Answer: C

Watch Video Solution

25. Two tuning forks have frequencies 380 and 384 Hz respectively. When they are sounded together they produce 4 beats. After hearing the maximum sound how long will it take to hear the minimum sound

A. $\frac{1}{2}$sec

B. $\frac{1}{4}$sec

C. $\frac{1}{8}$sec

D. $\frac{1}{16}$ sec

Answer: C

Watch Video Solution

26. Beats are produced with the help of two sound waves of amplitudes 3 and 5 units . The ratio of maximum to minimum intensity in the beats is

A. $2:1$

B. $5:3$

C. $4:1$

D. $16:1$

Answer: D

Watch Video Solution

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

A. 316 m/s

B. 331 m/s

C. 340 m/s

D. 360 m/s

Answer: A

Watch Video Solution

28. Two waves $y = 0.25 \sin 316t$ and $y = 0.25 \sin 310t$ are travelling in same direction. The number of beats produced per second will be

A. 6

B. 3

C. $3/\pi$

D. 3π

Answer: C

Watch Video Solution

29. The couple of tuning forks produces 2 beats in the time interval of 0.4 seconds. So the beat frequency is

A. 8 Hz

B. 5 Hz

C. 2 Hz

D. 10 Hz

Answer: B

Watch Video Solution

30. An unknown frequency x produces 8 beats per seconds with a freuquency of 250 Hz and 12 beats with $270 Hz$. Source then x is

A. 258 Hz

B. 242 Hz

C. 262 Hz

D. 282 Hz

Answer: A

Watch Video Solution

31. Beats are produced by two waves

$y_1 = a \sin 1000\pi t, y_2 = a \sin 998\pi t$

The number of beats / sec is

A. 0

B. 2

C. 1

D. 4

Answer: C

Watch Video Solution

32. The wavelength of two sound waves are $49cm$ and $50cm$, respectively . If the room temprature is $30^{\circ}C$, then the number of beats producted by them is approximatelt

(velocity of sound in air at $30^{\circ}C = 332m/s$)

A. 14

B. 10

C. 24

D. None of these

Answer: A

Watch Video Solution

33. Maximum number of beats frequency heard by a human being is

A. 10

B. 4

C. 20

D. 6

Answer: A

Watch Video Solution

34. Two sound waves of slightly different frequencies propagating in the same direction produce beats due to

A. Interference

B. Diffraction

C. Polarization

D. Refraction

Answer: A

Watch Video Solution

35. On sounding fork A with another tuning fork B of frequency $384Hz, 6beats$ are produced per second .After loading the prongs of A with wax and then sounding it again with $B, 4beats$ are produced per second. What is the frequency of the tuning fork A.

A. 388 Hz

B. 380 Hz

C. 378 Hz

D. 390 Hz

Answer: D

Watch Video Solution

36. It is possible to hear beats from the two vibrating sources of frequency

A. 100 Hz and 150 H

B. 20 Hz and 25 Hz

C. 400 Hz and 500 Hz

D. 1000 Hz and 1500 Hz

Answer: B

Watch Video Solution

37. A tuning fork gives 4 beats with 50 cm length of a sonometer 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. 396

B. 400

C. 404

D. 384

Answer: A

Watch Video Solution

38. Two sound waves of wavelengths 5 m and 6 m formed 30 beats in 3 seconds. The velocity of sound is

A. 300 ms

B. 310 ms

C. 320 ms

D. 330 ms

Answer: A

Watch Video Solution

39. The wavelength of a particle is 99 cm and that of other is 100 cm. Speed of sound is 396 m/s. The number of beats heard is

A. 4

B. 5

C. 1

D. 8

Answer: A

Watch Video Solution

40. A tuning fork arrangement (pair) produces $4beats/\sec$ with one fork of frequency $288cps$. A little wax is placed on the unknown fork and it then produces $2beats/\sec$. The frequency of the unknown fork is

A. 286 cps

B. 292 cps

C. 294 cps

D. 288 cps

Answer: B

Watch Video Solution

41. A tuning fork vibrates with 2 beats in 0.04 second. The frequency of the fork is

A. 50 Hz

B. 100 Hz

C. 80 Hz

D. None of these

Answer: A

Watch Video Solution

42. Two sound sources when sounded simultaneously produce four beats in 0.25 second. the difference in their frequencies must be

A. 4

B. 8

C. 16

D. 1

Answer: C

Watch Video Solution

43. A tuning fork of known frequency $256Hz$ makes 5 beats per second with the vibrating string of a piano. The beat frequency decreases to 2 beats per second when the tension in the piano string is slightly increased. The frequency of the piano string before increasing the tension was

A. 256 + 2 H

B. 256 + 2 H

C. 256 – 2 H

D. 256 – 5 H

Answer: D

Watch Video Solution

44. When temperature increases, the frequency of a tuning fork

A. Increases

B. Decreases

C. Remains same

D. Increases or decreases depending on the material

Answer: B

Watch Video Solution

45. Two strings X and Y of a sitar produces a beat of frequency $4Hz$. When the tension of string Y is slightly increased, the beat frequency is found to be $2Hz$. If the frequency of X is $300Hz$, then the original frequency of Y was.

A. 296 Hz

B. 298 Hz

C. 302 Hz

D. 304 Hz

Answer: A

Watch Video Solution

46. The freuquency of tuning forks A and B are respectively 3% more and 2% less than the frequency of tuning fork C. When A and B are simultaneously excited, 5 beats per second are produced. Then the frequency of the tuning fork A (in Hz)` Is

A. 98

B. 100

C. 103

D. 105

Answer: C

Watch Video Solution

47. When a tuning fork vibrates, the waves produced in the fork are

A. Longitudinal

B. Transverse

C. Progressive

D. Stationary

Answer: A

Watch Video Solution

48. 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

Watch Video Solution

49. When a tuning fork produces sound waves in air, which one of the following is same in the material of tuning fork as well as in air

A. Wavelength

B. Frequency

C. Velocity

D. Amplitude

Answer: B

Watch Video Solution

50. The disc of a siren containing 60 holes rotates at a constant speed of 360 rpm . The emitted sound is in unison with a tuning fork of frequency

A. 10 Hz

B. 360 Hz

C. 216 Hz

D. 6 Hz

Answer: B

Watch Video Solution

51. A sound source of frequency 170 Hz is placed near a wall. A man walking from a source towards the wall finds that there is a periodic rise and fall of sound intensity. If the speed of sound in air is 340 m / s the distance (in metres) separating the two adjacent positions of minimum intensity is

A. $1/2$

B. 1

C. $3/2$

D. 2

Answer: B

Watch Video Solution

Stationary Waves

1. What is the distance between a node and an adjoining antinode in a stationary wave?

A. λ

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

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

D. 2λ

Answer: C

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2. In stationary wave

A. Strain is maximum at nodes

B. Strain is maximum at antinodes

C. Strain is minimum at nodes

D. Amplitude is zero at all the points

Answer: A

Watch Video Solution

3. What is the phase difference between particles being on either side of a node?

A. 0°

B. 90°

C. 180°

D. 360°

Answer: C

Watch Video Solution

4. Which of the property makes difference between progressive and stationary waves

A. Amplitude

B. Frequency

C. Propagation of energy

D. Phase of the wave

Answer: C

Watch Video Solution

5. Stationary waves are formed when

A. Two waves of equal amplitude and equal frequency travel along the same path in opposite directions

B. Two waves of equal wavelength and equal amplitude travel along the same path with equal speeds in opposite directions

C. Two waves of equal wavelength and equal phase travel along the same path with equal speed

D. Two waves of equal amplitude and equal speed travel along the same path in opposite direction

Answer: B

Watch Video Solution

6. For the stationary wave $y = 4\sin\left(\frac{\pi x}{15}\right)\cos(96\pi t)$, the distance between a node and the next antinode is

A. 7.5

B. 15

C. 22.5

D. 30

Answer: A

Watch Video Solution

7. The equation of stationary wave along a stretched string is given by $y = 5\frac{\sin(\pi x)}{3}\cos 40\pi t$, where x and y are in cm and t in second. The separation between two adjacent nodes is

A. $1.5cm$

B. 3 cm

C. 6 cm

D. 4 cm

Answer: B

Watch Video Solution

8. The equation $\vec{\phi}(x, t) = \vec{j}\sin\left(\frac{2\pi}{\lambda}vt\right)\cos\left(\frac{2\pi}{\lambda}x\right)$ represents

A. Transverse progressive wave

B. Longitudinal progressive wave

C. Longitudinal stationary wave

D. Transverse stationary wave

Answer: D

Watch Video Solution

9. The equation of a stationary wave is $y = 0.8\cos\left(\frac{\pi x}{20}\right)\sin 200\pi t$ where x is in cm and t is in s. The separation between consecutive nodes will be

A. 20 cm

B. 10 cm

C. 40 cm

D. 30 cm

Answer: A

Watch Video Solution

10. In a stationary wave all the particles

A. At rest at the same time twice in every period of oscillation

B. At rest at the same time only once in every period of oscillation

C. Never at rest at the same time

D. Never at rest at all

Answer: A

Watch Video Solution

11. A wave representing by the equation $y = a\cos(kx - \omega t)$ is suerposed with another wave to form a stationary wave such that point $x = 0$ is a node. The equation for the other wave is

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

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

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

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

Answer: B

Watch Video Solution

12. At a certain instant a stationary transverse wave is found to have maximum kinetic energy. The appearance of string at that instant is

A. Sinusoidal shape with amplitude A /3

B. Sinusoidal shape with amplitude A /2

C. Sinusoidal shape with amplitude A

D. Straight line

Answer: D

Watch Video Solution

13. The equation $y = 0.15 \sin 5x \cos 3000t$, describes a stationary wave. The wavelength of the stationary wave is

A. Zero

B. 1.256 metres

C. 2.512 metres

D. 0.628 metre

Answer: D

Watch Video Solution

14. In stationary waves, antinodes are the points where there is

A. Minimum displacement and minimum pressure change

B. Minimum displacement and maximum pressure change

C. Maximum displacement and maximum pressure change

D. Maximum displacement and minimum pressure change

Answer: D

Watch Video Solution

15. In stationary waves all particles between two nodes pass through the mean position

A. At different times with different velocities

B. At different times with the same velocity

C. At the same time with equal velocity

D. At the same time with different velocities

Answer: D

Watch Video Solution

16. Standing waves can be produced

A. On a string clamped at both the ends

B. On a string clamped at one end and free at the other

C. When incident wave gets reflected from a wall

D. When two identical waves with a phase difference of π are moving in the same direction

Answer: A::B::C

Watch Video Solution

17. 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. 1.21Å

B. 2.42Å

C. 6.05Å

D. 3.63Å

Answer: A

Watch Video Solution

18. In stationary waves, distance between a node and its nearest antinode is 20 cm . The phase difference between two particles having a separation of 60 cm will be

A. Zero

B. $\pi/2$

C. π

D. $3\pi/2$

Answer: D

Watch Video Solution

19. Stationary waves of frequency 300 Hz are formed in a medium in which the velocity of sound is 1200 metre / sec . The distance between a node and the neighbouring antinode is

A. 1 m

B. 2 m

C. 3 m

D. 4 m

Answer: A

Watch Video Solution

20. Which two of the given transverse waves will give stationary waves when get superimposed

$z_1 = a\cos(kx - \omega t) \quad \ldots..(A)$

$z_2 = a\cos(kx + \omega t) \quad \ldots..(B)$

$z_3 = a\cos(kx - \omega t) \quad \ldots..(C)$

A. A and B

B. A and C

C. B and C

D. Any two

Answer: A

Watch Video Solution

21. A standing wave is represented by

$Y = \; = A\sin(100t)\cos(0.01x)$

A standing wave is represented by

A. $10^4 m/s$

B. $1m/s$

C. $10^{-4} m/s$

D. Not derivable from above data

Answer: A

Watch Video Solution

22. 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. 40 m / s

B. 20 m / s

C. 10 m / s

D. 5 m / s

Answer: B

Watch Video Solution

23. $y = a\cos(kx + \omega t)$ superimposes on another wave giving a stationary wave having node at x = 0. What is the equation of the other wave

A. $-a\cos(kx + \omega t)$

B. $a\cos(kx - \omega t)$

C. $-a\cos(kx-\omega t)$

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

Answer: C

Watch Video Solution

24. 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

Watch Video Solution

25. Energy is not carried by which of the following waves

A. Stationary

B. Progressive

C. Transverse

D. Electromagnetic

Answer: A

Watch Video Solution

26. The equation of stationary wave along a stretched string is given by $y = 5\sin\left(\frac{\pi x}{3}\right)\cos 40\pi t$, where x and y are in cm and t in second. The separation between two adjacent nodes is

A. 5 cm

B. πcm

C. 3 cm

D. 40 cm

Answer: C

Watch Video Solution

27. Two sinusoidal waves with same wavelengths and amplitudes travel in opposite directions along a string with a speed $10ms^{-1}$. If the minimum time interval between two instant when the string is flat is $0.5s$, the wavelength of the waves is

A. 25 m

B. 20 m

C. 15 m

D. 10 m

Answer: D

Watch Video Solution

28. "Stationary waves" are so called because in them

A. The particles of the medium are not disturbed at all

B. The particles of the medium do not execute SHM

C. There occurs no flow of energy along the wave

D. The interference effect can't be observed

Answer: C

Watch Video Solution

29. Two waves are approaching each other with a velocity of 16 m/s and frequency n. The distance between two consecutive nodes is

A. $\frac{16}{n}$

B. $\frac{8}{n}$

C. $\frac{n}{16}$

D. $\frac{n}{8}$

Answer: B

Watch Video Solution

30. Stationary waves

A. Transport energy

B. Does not transport energy

C. Have nodes and antinodes

D. Both (b) and (c)

Answer: D

Watch Video Solution

31. In a stationary wave all the particles

A. On either side of a node vibrate in same phase

B. In the region between two nodes vibrate in same phase

C. In the region between two antinodes vibrate in same phase

D. Of the medium vibrate in same phase

Answer: B

Watch Video Solution

32. When a stationary wave is formed then its frequency is

A. Same as that of the individual waves

B. Twice that of the individual waves

C. Half that of the individual waves

D. None of the above

Answer: A

Watch Video Solution

33. In stationary waves

A. Energy is uniformly distributed

B. Energy is minimum at nodes and maximum at antinodes

C. Energy is maximum at nodes and minimum at antinodes

D. Alternating maximum and minimum energy producing at nodes and antinodes

Answer: B

Watch Video Solution

34. Equation of a stationary wave is $y = 10\sin\left(\frac{\pi x}{4}\right)\cos 20\pi t$

Distance between two consecutive nodes is

A. 4

B. 2

C. 1

D. 8

Answer: A

Watch Video Solution

35. At nodes in stationary waves

A. Change in pressure and density are maximum

B. Change in pressure and density are minimum

C. Strain is zero

D. Energy is minimum

Answer: A

Watch Video Solution

36. Consider the three waves $z_1, z_2 \text{and} z_3$ as

$z_1 = A\sin(kx - \omega t)$

$z_2 = A\sin(kx + \omega t)$

$z_3 = A\sin(ky - \omega t)$

Which of the following represents a standing wave?

A. $z_1 + z_2$

B. $z_2 + z_3$

C. $z_3 + z_1$

D. $z_1 + z_2 + z_3$

Answer: A

Watch Video Solution

37. The following equations represent progressive transverse waves

$z_1 = A\cos(\omega t - kx)$

$z_2 = A\cos(\omega t + kx)$

$z_3 = A\cos(\omega t + ky)$

$z_4 = A\cos(2\omega t - 2ky)$

A stationary wave will be formed by superposing

A. Z_1 and Z_2

B. Z_1 and Z_4

C. Z_2 and Z_3

D. Z_3 and Z_4

Answer: A

Watch Video Solution

38. Two travelling waves $y_1 = A\sin[k(x - ct)]$ and $y_2 = A\sin[k(x + ct)]$ are superimposed on string. The distance between adjacent nodes is

A. ct / π

B. $ct / 2\pi$

C. $\pi / 2k$

D. π / k

Answer: D

Watch Video Solution

39. A string vibrates according to the equation $y = 5\sin\left(\frac{2\pi x}{3}\right)\cos 20\pi t$, where x and y are in cm and t in sec . The distance between two adjacent nodes is

A. 3 cm

B. $4.5cm$

C. 6 cm

D. $1.5cm$

Answer: D

Watch Video Solution

Vibration of string

1. A string fixed at both the ends is vibrating in two segments. The wavelength of the corresponding wave is

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

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

C. l

D. $2l$

Answer: C

Watch Video Solution

2. A 1 cm long string vibrates with fundamental frequency of 256 Hz . If the length is reduced to $\frac{1}{4}$ cm keeping the tension unaltered, the new fundamental frequency will be

A. 64

B. 256

C. 512

D. 1024

Answer: D

Watch Video Solution

3. 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. 2Hz

B. 4Hz

C. 5 Hz

D. 10 Hz

Answer: C

Watch Video Solution

4. The velocity of waves in a string fixed at both ends is 2 m / s . The string forms standing waves with nodes 5.0 cm apart. The frequency of vibration of the string in Hz is

A. 40

B. 30

C. 20

D. 10

Answer: C

Watch Video Solution

5. Which of the following is the example of transverse wave

A. Sound waves

B. Compressional waves in a spring

C. Vibration of string

D. All of these

Answer: C

Watch Video Solution

6. A stretched string of length $1m$ fixed at both ends , having a mass of $5 \times 10^{-4} kg$ is under a tension of $20N$. It is plucked at a point situated at $25cm$ from one end . The stretched string would vibrate with a frequency of

A. 100 Hz

B. 200 Hz

C. 256 Hz

D. 400 Hz

Answer: B

Watch Video Solution

7. There are two wires, each produces frequency of 500Hz. By what percentage tension in one wire is increased so that 5 beats per second can be heard?

A. 0.01

B. 0.02

C. 0.03

D. 0.04

Answer: B

Watch Video Solution

8. The linear density of a vibrating string is $1.3 \times 10^{-4} kg/m$ A transverse wave is propagating on the string and is described by the equation $y = 0.021 \sin(x + 30t)$ where x and y are measured in meter and t in second the tension in the string is :-

A. 10 N

B. 0.5 N

C. 1 N

D. 0.12 N

Answer: D

Watch Video Solution

9. If the tension of sonometer's wire increases four times then the fundamental frequency of the wire will increase by

A. 2 times

B. 4 times

C. 1/2 times

D. None of the above

Answer: A

Watch Video Solution

10. If vibrations of a string are to be increased by a factor of two, then tension in the string must be made

A. Half

B. Twice

C. Four times

D. Eight time

Answer: C

Watch Video Solution

11. Four wires of identical lengths, diameters and materials are stretched on a sonometer box. The ratio of their tension $1:4:9:16$. The ratio of their fundamental frequencies is

A. $16:9:4:1$

B. $4:3:2:1$

C. $1:4:2:16$

D. $1:2:3:4$

Answer: D

Watch Video Solution

12. A tuning fork vibrating with a sonometer having 20 cm wire produces 5 beats per second. The beat frequency does not change if the length of the wire is changed to 21 cm. The frequency of the tuning fork (in Hertz) must be

A. 200

B. 210

C. 205

D. 215

Answer: C

Watch Video Solution

13. A stretched string of length l, fixed at both ends can sustain stationary waves of wavelength λ given by

A. $\lambda = \frac{n^2}{2l}$

B. $\lambda = \frac{l^2}{2n}$

C. $\lambda = \frac{2l}{n}$

D. $\lambda = 2 \ln$

Answer: C

Watch Video Solution

14. If you set up the seventh harmonic on a string fixed at both ends, how many nodes and antinodes are set up in it

A. 8,7

B. 7,7

C. 8,9

D. 9,8

Answer: A

Watch Video Solution

15. If you set up the ninth harmonic on a string fixed at both ends, its frequency compared to the seventh harmonic

A. Higher

B. Lower

C. Equal

D. None of the above

Answer: A

Watch Video Solution

16. Frequency of a sonometer wire is n. Now its tension is increased 4 times and its length is doubled then new frequency will be

A. n/2

B. 4n

C. 2n

D. n

Answer: D

Watch Video Solution

17. A device used for investigating the vibration of a fixed string or wire is

A. Sonometer

B. barometer

C. Hydrometer

D. None of these

Answer: A

Watch Video Solution

18. A string on a musical instrument is 50 cm long and its fundamental frequency is 270 Hz. If the desired frequency of 1000 Hz, is to be produced, the required length of the string is

A. 13.5 cm

B. 2.7 cm

C. 5.4 cm

D. 10.3 cm

Answer: A

Watch Video Solution

19. The tension in a piano wire is $10N$. The tension ina piano wire to produce a node of double frequency is

A. 5N

B. 20 N

C. 40 N

D. 80 N

Answer: C

Watch Video Solution

20. To increase the frequency from 100 Hz to 400 Hz the tension in the string has to be changed by

A. 4 times

B. 16 times

C. 20 times

D. None of these

Answer: B

Watch Video Solution

21. In order to double the frequency of the fundamental note emitted by a stretched string, the length is reduced to $\frac{3}{4}$th of the original length and the tension is changed. The factor by which the tenstion is to be changed is

A. $\frac{3}{8}$

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

C. $\frac{8}{9}$

D. $\frac{9}{4}$

Answer: D

Watch Video Solution

22. A string of 7 m length has a mass of 0.035 kg. If tension in the string is 60.5 N. Then speed of a wave on the string is

A. 77 m/s

B. 102 m/s

C. 110 m/s

D. 165 m/s

Answer: C

Watch Video Solution

23. A second harmonic has to be generated in a string of length l stretched between two rigid supports. The point where the string has to be plucked and touched are

A. Plucked at $\frac{l}{4}$ and touch at $\frac{l}{2}$

B. Plucked at $\frac{l}{4}$ and touch at $\frac{3l}{4}$

C. Plucked at $\frac{l}{2}$ and touches at $\frac{l}{4}$

D. Plucked at $\frac{l}{2}$ and touched at $\frac{3l}{4}$

Answer: A

Watch Video Solution

24. Transverse waves of same frequency are generated in two steel wires A and B . The diameter of A is twice of B and the tension in A is half that in B. The ratio of velocities of wave in A and B is

A. $1:3\sqrt{2}$

B. $1:2\sqrt{2}$

C. $1:2$

D. $\sqrt{2}:1$

Answer: B

Watch Video Solution

25. A sonometer wire resonates with a given tuning fork forming a standing wave with five antinodes between the two bridges when a mass of $9kg$ is suspended from the wire. When this mass is replaced by a mass 'M' kg, the wire resonates with the same tuning fork forming three antinodes for the same positions of the bridges. Find the value of M.

A. 25 kg

B. 5 kg

C. 12.5 kg

D. 1/25 kg

Answer: A

Watch Video Solution

26. The tension of a stretched string is increased by 69%. In order to keep its frequency of vibration constant, its length must be increased by :

A. 0.2

B. 0.3

C. $\sqrt{69}\,\%$

D. 0.69

Answer: B

Watch Video Solution

27. The length of a sonometer wire tuned to a frequency of 250 Hz is 0.60 metre . The frequency of tuning fork with which the vibrating wire will be in tune when the length is made 0.40 metre is

A. 250 Hz

B. 375 Hz

C. 256 Hz

D. 384 Hz

Answer: B

Watch Video Solution

28. Length of a string tied to two rigid support is $40cm$. Maximum length (wavelength in cm) of a stationary wave produced on it is

A. 20

B. 80

C. 40

D. 120

Answer: B

Watch Video Solution

29. A string in a musical instrument is $50cm$ long and its fundamental frequency is $800Hz$. If the frequency of $1000Hz$ is to be produced then required length of spring is

A. 62.5 cm

B. 50 cm

C. 40 cm

D. 37.5 cm

Answer: C

Watch Video Solution

30. Two wires are in unison. If the tension in one of the wires is increased by 2%, 5 beats are produced per second. The initial frequency of each wire is

A. 200 Hz

B. 400 Hz

C. 500 Hz

D. 1000 Hz

Answer: C

Watch Video Solution

31. Two uniform strings A and B made of steel are made to vibrate under the same tension. If the first overtone of A is equal to the second overtone of B and if the radius of A is twice that of B, the ratio of the lengths of the strings is

A. $1:2$

B. $1:3$

C. $1:4$

D. $1:6$

Answer: B

Watch Video Solution

32. If the length of a stretched string is shortened by 40% and the tension is increased by 44%, then the ratio of the final and initial fundamental frequencies is

A. $2:1$

B. $3:2$

C. $3:4$

D. $1:3$

Answer: A

Watch Video Solution

33. Two wires are fixed in a sanometer. Their tension are in the ratio $8:1$ The lengths are in the ratio $36:35$ The diameter are in the ratio $4:1$ Densities of the materials are in the ratio $1:2$ if the lower frequency in the setting is $360Hz$. The beat frequency when the two wires are sounded together is

A. 5

B. 8

C. 6

D. 10

Answer: D

Watch Video Solution

34. The first overtone of a stretched string of given length is 320 Hz. The first harmonic is

A. 320 Hz

B. 160 Hz

C. 480 Hz

D. 640 Hz

Answer: B

Watch Video Solution

35. Two instruments having stretched strings are being played in unison . When the tension in one of the instruments is increases by 1% , 3 beats are produced in $2s$. The initial frequency of vibration of each wire is

A. $220s^{-1}$

B. $320s^{-1}$

C. $150s^{-1}$

D. $300s^{-1}$

Answer: D

Watch Video Solution

36. A tuning fork of frequency 392 Hz , resonates with 50 cm length of a string under tension (T). If length of the string is decreased by 2%, keeping the tension constant, the number of beats heard when the string and the tuning fork made to vibrate simultaneously is

A. 4

B. 6

C. 8

D. 12

Answer: C

Watch Video Solution

37. The sound carried by air from a sitar to a listener is a wave of the following type

A. Longitudinal stationary

B. Transverse progressive

C. Transverse stationary

D. Longitudinal progressive

Answer: D

Watch Video Solution

38. In Melde's experiment in the transverse mode, the frequency of the tuning fork and the frequency of the waves in the strings are in the ratio

A. $1:1$

B. $1:2$

C. $2:1$

D. $4:1$

Answer: A

Watch Video Solution

39. The frequency of transverse vibrations in a stretched string is 200 Hz . If the tension is increased four times and the length is reduced to one-fourth the original value, the frequency of vibration will be

A. 25 Hz

B. 200 Hz

C. 400 Hz

D. 1600 Hz

Answer: D

Watch Video Solution

40. Three similar wires of frequency n_1, n_2 and n_3 are joined to make one wire. Its frequency will be

A. $n = n_1 + n_2 + n_3$

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

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

D. $\frac{1}{n^1} = \frac{1}{n_1^2} + \frac{1}{n_2^2} + \frac{1}{n_3^2}$

Answer: B

Watch Video Solution

41. A steel rod 100 cm long is clamped at its middle. The fundamental frequency of longitudinal vibrations of the rod is given to be 2.53k Hz. What is the speed of sound in steel?

A. 5.06 km/s

B. 6.06 km/s

C. 7.06 km/s

D. 8.06 km/s

Answer: A

Watch Video Solution

42. Two wires are producing fundamental notes of the same frequency. Change in which of the following factors of one wire will not produce beats between them

A. Amplitude of the vibrations

B. Material of the wire

C. Stretching force

D. Diameter of the wire

Answer: A

Watch Video Solution

43. Calculate the frequency of the second harmonic formed on a string of length 0.5 m and mass 2×10^{-4} kg when stretched with a tension of 20 N

A. 27.44 Hz

B. 744.2 Hz

C. 44.72 Hz

D. 447.2 Hz

Answer: D

Watch Video Solution

44. The fundamental frequency of a string stretched with a weight of 4 kg is 256 Hz . The weight required to produce its octave is

A. 4 kg wt

B. 8 kg wt

C. 12 kg wt

D. 16 kg wt

Answer: D

Watch Video Solution

45. Two vibrating strings of the same material but lengths L and $2L$ have radii $2r$ and r respectively. They are stretched under the same tension. Both the string vibrate in their fundamental nodes, the one of length L with freuqency v_1 and the other with frequency v_2. the ratio v_1 / v_2 is given by

A. 2

B. 4

C. 8

D. 1

Answer: D

Watch Video Solution

46. If the tension and diameter of a sonometer wire of fundamental frequency n are doubled and density is halved then its fundamental frequency will become

A. $\dfrac{n}{4}$

B. $\sqrt{2}n$

C. n

D. $\dfrac{n}{\sqrt{2}}$

Answer: C

Watch Video Solution

47. In a sonometer wire, the tension is maintained by suspending a 50.7 kg mass from the free end of the wire. The suspended mass has a volume of 0.0075 m 3. The fundamental frequency of the wire is 260 Hz . If the suspended mass is completely submerged in water, the fundamental frequency will become (take $g = 10ms^{-2}$) [

A. 240 Hz

B. 230 Hz

C. 220 Hz

D. 200 Hz

Answer: A

Watch Video Solution

48. A string is rigidly tied at two ends and its equation of vibration is given by $y = \sin 2\pi x . \cos 2\pi t$. Then minimum length of string is

A. 1m

B. $\frac{1}{2}m$

C. 5m

D. $2\pi m$

Answer: B

Watch Video Solution

49. Fundamental frequency of sonometer wire is n. If the length. Tension and diameter of wire are tripled. The new findamental frequency is

A. $\frac{n}{\sqrt{3}}$

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

C. $n\sqrt{3}$

D. $\frac{n}{3\sqrt{3}}$

Answer: D

Watch Video Solution

50. A string of length 2 m is fixed at both ends. If this string vibrates in its fourth normal mode with a frequency of 500 Hz then the waves would travel on it is with a velocity of

A. 125 m/s

B. 250 m/s

C. 500 m/s

D. 1000 m/s

Answer: C

Watch Video Solution

51. The fundamental frequency of a sonometre wire is n . If its radius is doubled and its tension becomes half, the material of the wire remains same, the new fundamental frequency will be

A. n

B. $\frac{n}{\sqrt{2}}$

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

D. $\frac{n}{2\sqrt{2}}$

Answer: D

Watch Video Solution

52. In an experiment with sonometer, a tuning fork of frequency 256 Hz resonates with a length of 25 cm and another tuning fork resonates with a length of 16 cm. Tension of the string remaining constant, the frequency of the second tuning fork is –

A. 163.84 Hz

B. 400 Hz

C. 320 Hz

D. 204.8 Hz

Answer: B

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Organ pipe

1. The length of two open organ pipes are l and $(l + \delta l)$ respectively. Neglecting end correction, the frequency of beats between them will b approximately.

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

B. $\frac{v}{4l}$

C. $\frac{v\Delta l}{2l^2}$

D. $\frac{v\Delta l}{l}$

Answer: C

Watch Video Solution

2. A tube, closed at one end and containing air, produces, when excited, the fundamental note of frequency $512Hz$. If the tube is open at both ends the fundamental frequency that can be excited is (in Hz)

A. 1024 Hz

B. 512 Hz

C. 256 Hz

D. 128 Hz

Answer: A

Watch Video Solution

3. A closed organ pipe and an open organ pipe have their first overtones identical in frequency . Their lenghts are in the ratio

A. $1:2$

B. $2:3$

C. $3:4$

D. $4:5$

Answer: C

Watch Video Solution

4. The first overtone in a closed pipe has a frequency

A. Same as the fundamental frequency of an open tube of same length

B. Twice the fundamental frequency of an open tube of same length

C. Same as that of the first overtone of an open tube of same length

D. None of the above

Answer: D

Watch Video Solution

5. An empty vessel is partially filled with water, then the frequency of vibration of air column in the vessel

A. Remains same

B. Decreases

C. Increases

D. First increases then decreases

Answer: C

Watch Video Solution

6. It is desired to increase the fundamental resonance frequency in a tube which is closed at one end. This can be achieved by

A. Replacing the air in the tube by hydrogen gas

B. Increasing the length of the tube

C. Decreasing the length of the tube

D. Opening the closed end of the tube

Answer: A::C::D

Watch Video Solution

7. An air column in a pipe, which is closed at one end, will be in resonance with a vibrating body of frequency 166 Hz , the length of the air column is

A. 2.00 m

B. 1.50 m

C. 1.00 m

D. 0.50 m

Answer: D

Watch Video Solution

8. If the velocity of sound in air is 350 m/s . Then the fundamental frequency of an open organ pipe of length 50 cm, will be

A. 350 Hz

B. 175 Hz

C. 900 Hz

D. 750 Hz

Answer: A

Watch Video Solution

9. If the length of a closed organ pipe is 1m and velocity of sound is 330 m/s , then the frequency for the second note is

A. $4 \times \frac{330}{4} Hz$

B. $3 \times \frac{330}{4} Hz$

C. $2 \times \frac{330}{4} Hz$

D. $2 \times \frac{4}{330} Hz$

Answer: B

Watch Video Solution

10. The fundamental note produced by a closed organ pipe is of frequency . f The fundamental note produced by an open organ pipe of same length will be of frequency

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

B. f

C. 2f

D. 4f

Answer: C

Watch Video Solution

11. If the velocity of sound in air is 336 m/s. The maximum length of a closed pipe that would produce a just audible sound will be

A. 3.2 cm

B. 4.2 m

C. 4.2 cm

D. 3.2 m

Answer: B

Watch Video Solution

12. An organ pipe P_1 closed at one end vibrating in its first overtone and another pipe P_2 open at both ends vibrating in third overtone are in resonance with a given tuning fork . The ratio of the length of P_1 to that of P_2 is

A. $1:2$

B. $1:3$

C. $3:8$

D. $3:4$

Answer: C

Watch Video Solution

13. A resonance air column of length 20 cm resonates with a tuning fork of frequency 250 Hz . The speed of sound in air is

A. $300m/s$

B. $200m/s$

C. $150m/s$

D. $75m/s$

Answer: B

Watch Video Solution

14. 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. $3f_0/4$

B. f_0

C. $f_0 / 2$

D. $2f_0$

Answer: B

Watch Video Solution

15. If the length of a speed oragn pipe is $1.5m$ and velocity of sound is 330 m/s , then the frequency for the second note is

A. 220 Hz

B. 165 Hz

C. 110 Hz

D. 55 Hz

Answer: B

Watch Video Solution

16. A pipe 30 cm long is open at both ends. Which harmonic mode of the pipe is resonantly excited by a 1.1 kHz source ? (Take speed of sound in air $= 330ms^{-1}$)

A. First

B. Second

C. Third

D. Fourth

Answer: A

Watch Video Solution

17. Two closed organ pipes, when sounded simultaneously gave 4 beats per sec. If longer pipe has a length of 1 m. Then length of

shorter pipe will be (v=300 m//s`

A. $185.5cm$

B. $94.9cm$

C. $90cm$

D. $80cm$

Answer: B

Watch Video Solution

18. A source of sound placed at the open end of a resonance column sends an acoustic wave of pressure amplitude P_0 inside the tube. If the atmospheric pressure is P_A, then the ratio of maximum and minimum pressure at the closed end of the tube will be

A. $\dfrac{(\rho_A + \rho_0)}{(\rho_A - \rho_0)}$

B. $\dfrac{(\rho_A + 2\rho_0)}{(\rho_A - 2\rho_0)}$

C. $\frac{\rho_A}{\rho_A}$

D. $\frac{\left(\rho_A + \frac{1}{2}\rho_0\right)}{\left(\rho_A - \frac{1}{2}\rho_0\right)}$

Answer: A

Watch Video Solution

19. Two closed pipe produce 10 beats per second when emitting their fundamental nodes. If their length are in ratio of 25 : 26. Then their fundamental frequency in Hz , are

A. 270, 280

B. 260, 270

C. 260, 250

D. 260, 280

Answer: C

Watch Video Solution

20. A closed organ pipe and an open organ pipe are tuned to the same fundamental frequency. The ratio of their lengths is

A. $1:2$

B. $2:1$

C. $2:3$

D. $4:3$

Answer: A

Watch Video Solution

21. An open pipe resonates with a tuning fork of frequency $500Hz$. It is observed that two successive notes are formed at distance

16 and $46cm$ from the open end. The speed of sound in air in the pipe is

A. $230m/s$

B. $300m/s$

C. $320m/s$

D. $360m/s$

Answer: B

Watch Video Solution

22. Find the fundamental frequency of a closed pipe, if the length of the air column is 42 m . (speed of sound in air = 332 m/sec)

A. 2 Hz

B. 4 Hz

C. 7 Hz

D. 9 Hz

Answer: A

Watch Video Solution

23. If v is the speed of sound in air then the shortest length of the closed pipe which resonates to a frequency n

A. $\frac{v}{4n}$

B. $\frac{v}{2n}$

C. $\frac{2n}{v}$

D. $\frac{4n}{v}$

Answer: A

Watch Video Solution

24. The frequency of fundamental tone in an open organ pipe of length 0.48 m is 320 Hz. Speed of sound is 320 m/sec. Frequency of fundamental tone in closed organ pipe will be

A. $153.8Hz$

B. $160.0Hz$

C. $320.0Hz$

D. $143.2Hz$

Answer: B

Watch Video Solution

25. The fundamental frequency of a closed organ pipe is $50Hz$. The frequency of the second overtone is

A. $100Hz$

B. $50Hz$

C. $250Hz$

D. $150Hz$

Answer: C

Watch Video Solution

26. Two open pipes of length 25 cm and 25.5 cm produced 0.1 beat/second. The velocity of sound will be :-

A. $255m/s$

B. $250m/s$

C. $350m/s$

D. None of these

Answer: A

Watch Video Solution

27. What is minimum length of a tube, open at both ends, that resonates with tuning fork of frequency 350 Hz ? [velocity of sound in air = 350 m/s]

A. $50cm$

B. $100cm$

C. $75cm$

D. $25cm$

Answer: A

Watch Video Solution

28. Two open organ pipes give 4 beats/sec when sounded together in their fundamental nodes. If the length of the pipe are 100 cm and 102.5 cm respectively, then the velocity of sound is :

A. $496m / s$

B. $328m / s$

C. $240m / s$

D. $160m / s$

Answer: B

Watch Video Solution

29. The harmonics which are present in a pipe open at one end are

A. Odd harmonics

B. Even harmonics

C. Even as well as odd harmonics

D. None of these

Answer: A

Watch Video Solution

30. An open pipe is suddenly closed at one end with the result that the frequency of third harmonic of the closed pipe is found to be higher by $100Hz$ then the fundamental frequency of the open pipe. The fundamental frequency of the open pipe is

A. $480Hz$

B. $300Hz$

C. $240Hz$

D. $200Hz$

Answer: D

Watch Video Solution

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

A. $1:2$

B. $1:4$

C. $2:1$

D. $4:1$

Answer: C

Watch Video Solution

32. What is the effect of increase in temperature on the frequency of sound produced by an organ pipe?

A. Increases

B. Decreases

C. Unchanged

D. Not definite

Answer: A

Watch Video Solution

33. The apparatus used to find the speed of sound in a gas is

A. Melde's apparatus

B. Kundt's tube

C. Quincke's tube

D. None of these

Answer: B

Watch Video Solution

34. Standing stationary waves can be obtained in an air column even if the interfering waves are

A. Of different pitches

B. Of different amplitudes

C. Of different qualities

D. Moving with different velocities

Answer: B

Watch Video Solution

35. The stationary wave $y = 2a \sin kx \cos \omega t$ in a closed organ pipe is the result of the superposition of $y = a \sin(\omega t - kx)$

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

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

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

D. $y = a\cos(\omega t + kx)$

Answer: B

Watch Video Solution

36. Stationary waves are setup in an air column. Velocity of sound in air is $330ms^{-1}$ and frequency is $165Hz$. The distance between two successive nodes is

A. $2m$

B. $1m$

C. $0.5m$

D. $4m$

Answer: B

Watch Video Solution

37. An open pipe of length l vibrates in fundamental mode. The pressure variation is maximum at

A. $1/4$ from ends

B. The middle of pipe

C. The ends of pipe

D. At 1/8 from ends of pipe middle of the pipe

Answer: B

Watch Video Solution

38. Fundamental frequency of pipe is 100 Hz and other two frequencies are 300 Hz and 500 Hz then

A. Pipe is open at both the ends

B. Pipe is closed at both the ends

C. One end open and another end is closed

D. None of the above

Answer: C

Watch Video Solution

39. Fundamental frequency of an open pipe of length 0.5 m is equal to the frequency of the first overtone of a closed pipe of length l . The value of l_c is (m)

A. 1.5

B. 0.75

C. 2

D. 1

Answer: B

Watch Video Solution

40. In a closed organ pipe the frequency of fundamental note is 50 Hz . The note of which of the following frequencies will not be emitted by it

A. $50Hz$

B. $100Hz$

C. $150Hz$

D. None of the above

Answer: B

Watch Video Solution

41. On producing the waves of frequency 1000 Hz in a kundt's tube the total distance between 6 successive nodes n 85 cm. Speed of sound in the gas filled in the tude is

A. $330m/s$

B. $340m/s$

C. $350m/s$

D. $300m/s$

Answer: B

Watch Video Solution

42. What is the base frequency if a pipe gives notes of frequencies 425, 255 and 595 and decide whether it is closed at one end or open at both ends?

A. 17, closed

B. 85, closed

C. 17, open

D. 85, open

Answer: B

Watch Video Solution

43. A student determines the velocity of sound with the help of a closed organ pipe. If the observed length for fundamental frequency is 24.7 m , the length for third harmonic will be

A. $74.1cm$

B. $72.7cm$

C. $75.4cm$

D. $73.1cm$

Answer: A

Watch Video Solution

44. An open pipe of length 33 cm resonates with frequency of 100 Hz . If the speed of sound is 330 m/s , then this frequency is

A. Fundamental frequency of the pipe

B. Fundamental frequency of the pipe

C. Second harmonic of the pipe

D. Fourth harmonic of the pipe

Answer: C

Watch Video Solution

45. In a resonance tube the first resonance with a tuning fork occurs at 16 cm and second at 49 cm . If the velocity of sound is 330 m/s , the frequency of tuning fork is

A. 500 Hz

B. 300 Hz

C. 330 Hz

D. 165 Hz

Answer: A

Watch Video Solution

46. Two closed organ pipes of length 100 cm and 101 cm 16 beats is 20 sec. When each pipe is sounded in its fundamental mode calculate the velocity of sound `

A. 303 ms

B. 332 ms

C. 323.2 ms

D. 300 ms

Answer: C

Watch Video Solution

47. In open organ pipe, if fundamental frequency is n then the other frequencies are

A. $n, 2n, 3n, 4n$

B. $n, 3n, 5n$

C. $n, 2n, 4n, 8n$

D. None of these

Answer: A

Watch Video Solution

48. If in an experiment for determination of velocity of sound by resonance tube method using a tuning fork of $512Hz$, first resonance was observed at$30.7cm$ and second was obtained at $63.2cm$, then maximum possible error in velocity of sound is (consider actual speed of sound in air is `332m//s

A. 204 cm/sec

B. 110 cm/sec

C. 58 cm /sec

D. 80 cm/sec

Answer: D

Watch Video Solution

49. An organ pipe, open from both end produces 5 beats per second when vibrated with a source of frequency 200 Hz . The second harmonic of the same pipes produces 10 beats per second with a source of frequency 420 Hz . The frequency of source is

A. 195 Hz

B. 205 Hz

C. 190 Hz

D. 210 Hz

Answer: B

Watch Video Solution

50. In one metre long open pipe what is the harmonic of resonance obtained with a tuning fork of frequency 480 Hz

A. First

B. Second

C. Third

D. Fourth

Answer: C

Watch Video Solution

51. An organ pipe open at one end is vibrating in first overtone and is in resonance with another pipe open at both ends and vibrating in third harmonic. The ratio of length of two pipes is–

A. $1:2$

B. $4:1$

C. $8:3$

D. $3:8$

Answer: A

Watch Video Solution

52. In a resonance pipe the first and second resonance are obtained at depths 22.7 cm and 70.2 respectively. What will be the end correction?

A. 1.05 cm

B. 115.5 cm

C. 92.5 cm

D. 113.5 cm

Answer: A

Watch Video Solution

53. An open tube is in resonance with string (frequency of vibration of tube is n 0). If tube is dipped in water so that 75% of length of tube is inside water, then the ratio of the frequency of tube to string now will be

A. 1

B. 2

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

D. $\frac{3}{2}$

Answer: B

Watch Video Solution

1. The change in frequency due to Doppler effect does not depend on

A. The frequency of the wave produced

B. The velocity of the source

C. The velocity of the observer

D. Distance from the source to the listener

Answer: D

Watch Video Solution

2. A source of sound of frequency 450 cycles / sec is moving towards a stationary observer with 34 m / sec speed. If the speed of sound is 340 m / sec , then the apparent frequency will be

A. 410 cycles / sec

B. 500 cycles / sec

C. 550 cycles / sec

D. 450 cycles / sec

Answer: B

Watch Video Solution

3. The wavelength is 120 cm when the source is stationary. If the source is moving with relative velocity of 60 m / sec towards the observer, then the wavelength of the sound wave reaching to the observer will be (velocity of sound = 330 m / s)

A. 98 cm

B. 140 cm

C. 120 cm

D. 144 cm

Answer: A

Watch Video Solution

4. The frequency of a whistle of an engine is 600 cycles / sec is moving with the speed of 30 m / sec towards an observer. The apparent frequency will be (velocity of sound = 330 m / s)

A. 600 cps

B. 660 cps

C. 990 cps

D. 330 cps

Answer: B

Watch Video Solution

5. A source of sound emits waves with frequency f Hz and speed V m / sec . Two observers move away from this source in opposite directions each with a speed 0.2 V relative to the source. The ratio of frequencies heard by the two observers will be

A. $3:2$

B. $2:3$

C. $1:1$

D. $4:10$

Answer: C

Watch Video Solution

6. The source producing sound and an observer both are moving along the direction of propagation of sound waves. If the respective velocities of sound, source and an observer are v, v_s and v_0, then the apparent frequency heard by the observer will be (n = frequency of sound)

A. $\frac{n(v+v_o)}{v-v_o}$

B. $\frac{n(v-v_o)}{v-v_s}$

C. $\frac{n(v-v_o)}{v+v_s}$

D. $\frac{n(v+v_o)}{v+v_s}$

Answer: B

Watch Video Solution

7. An observer moves towards a stationary source of sound of frequency n . The apparent frequency heard by him is 2 n . If the velocity of sound in air is 332 m/sec, then the velocity of the observer is

A. 166 m / sec

B. 664 m / sec

C. 332 m / sec

D. 1328 m / sec

Answer: C

Watch Video Solution

8. An observer is moving towards the stationary source of sound, then

A. Apparent frequency will be less than the real frequency

B. Apparent frequency will be greater than the real frequency

C. Apparent frequency will be equal to real frequency

D. Only the quality of sound will change

Answer: B

Watch Video Solution

9. A whistle sends out 256 waves in a second. If the whistle approaches the observer with velocity 1/3 of the velocity of sound in air, the number of waves per second the observer will receive

A. 384

B. 192

C. 300

D. 200

Answer: A

Watch Video Solution

10. A person observes a change of 2.5 % in frequency of sound of horn of a car. If the car is approaching forward the person & sound velocity is 320 m/s, then velocity of car in m/s will be approximately :-

A. 8 m / s (approx.)

B. 800 m / s

C. 7 m / s

D. 6 m / s (approx.)

Answer: A

Watch Video Solution

11. Two passenger trains moving with a speed of $108 km / hour$ cross each other. One of them blows a whistle whose frequency is $750 Hz$. If sound speed is $330 m / s$, then passengers sitting in the other train, after trains cross each other will hear sound whose frequency will be

A. 900 Hz

B. 625 Hz

C. 750 Hz

D. 800 Hz

Answer: B

Watch Video Solution

12. With what velocity an observer sould move relative to a stationary source so that he hears a sound of double the frequency of souce?

A. Velocity of sound towards the source

B. Velocity of sound away from the source

C. Half the velocity of sound towards the source

D. Double the velocity of sound towards the source

Answer: A

Watch Video Solution

13. A source of sound emitting a note of frequency 200 Hz moves towards an observer with a velocity v equal to the velocity of sound. If the observer also moves away from the source with the same velocity v, the apparent frequency heard by the observer is

A. 50 Hz

B. 100 Hz

C. 150 Hz

D. 200 Hz

Answer: D

Watch Video Solution

14. Doppler's effect will not be applicable when the velocity of sound source is

A. Equal to that of the sound velocity

B. Less than the velocity of sound

C. Greater than the velocity of sound

D. Zero

Answer: C

View Text Solution

15. An observer while going on scooter hears sound of two sirens of same frequencies from two opposite directions. If he travels along the direction of one of the siren, then he

A. Listens resonance

B. Listens beats

C. Will not listen sound due to destructive interference

D. Will listen intensive sound due to constructive interference

Answer: B

Watch Video Solution

16. A source of sound is travelling towards a stationary observer. The frequency of sound heard by the observer is of three times the original frequency. The velocity of sound is v m / sec . The speed of source will be

A. $\frac{2}{3}v$

B. v

C. $\frac{3}{2}v$

D. $3v$

Answer: A

Watch Video Solution

17. A sound spurce is moving towards a stationary observer with 1/10 of the speed of sound. The ratio of apparent to real frequency is

A. $10/9$

B. $11/10$

C. $(11/10)^2$

D. $(9/10)^2$

Answer: A

Watch Video Solution

18. The speed of sound in air at a given temperature is 350 m/ s. An engine blows whistle at a frequency of 1200 cps. It is approaching the observer with velocity 50 m/s. The apparent frequency in cps heard by the observer will be

A. 600

B. 1050

C. 1400

D. 2400

Answer: C

Watch Video Solution

19. Suppose that the speed of sound in air at a given temperature is 400 m / sec . An engine blows a whistle at 1200 H z frequency. It is approaching an observer at the speed of 100 m / sec . What is the apparent frequency as heard by the observer

A. 600 Hz

B. 1200 Hz

C. 1500 Hz

D. 1600 Hz

Answer: D

Watch Video Solution

20. A source of frequency 150 Hz is moving in the direction of a person with a velocity of 110 m / s . The frequency heard by the person will be (speed of sound in medium = 330 m / s)

A. 225 Hz

B. 200 Hz

C. 150 Hz

D. 100 Hz

Answer: A

Watch Video Solution

21. The Doppler's effect is applicable for

A. Light waves

B. Sound waves

C. Space waves

D. Both (a) and (b)

Answer: D

Watch Video Solution

22. A source sound is moving with constant velocity of $20m/s$ emitting a note of frequency $1000Hz$. The ratio of frequencies observed by a stationary observer while the source approaching him and after it crosses him will be source is approaching him and after it crosses him will be

A. $9:8$

B. $8:9$

C. $1:1$

D. $9:10$

Answer: A

Watch Video Solution

23. A source of sound S is moving with a velocity of $50m/s$ towards a stationary observer. The observer measures the frequency of the source as 1000 Hz. What will be the apparent frequency of the source 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 the sound in the medium is $350m/s$

A. 750 Hz

B. 857 Hz

C. 1143 Hz

D. 1333 Hz

Answer: A

Watch Video Solution

24. A source and a listener are both moving towards each other with speed $v/10$, where v is the speed of sound. If the frequency of the note emitted by the source is f, the frequency heard by the listener would be nearly

A. 1.11 f

B. 1.22 f

C. f

D. 1.27 f

Answer: B

Watch Video Solution

25. A table is revolving on its axis at 5 revolutions per second. A sound source of frequency $1000Hz$is fixed on the table at $70cm$ from the axis. The minimum frequency heard by a listener standing at a distance from the table will be (speed of sound $= 352m/s$).

A. 1000 Hz

B. 1066 Hz

C. 941 Hz

D. 352 Hz

Answer: C

Watch Video Solution

26. A source of sound S of frequency 500 Hz situated between a stationary observer O and wall W, moves towards the wall with a speed of $2m/s$. If the velocity of sound is $332m/s$. Then the number of beats per second heard by the observer is (approximately)

A. 8

B. 6

C. 4

D. 2

Answer: B

Watch Video Solution

27. A motor car blowing a horn of frequency $124 vib/\sec$ moves with a velocity $72km/hr$ towards a tall wall. The frequency of the reflectedf sound heard by the driver will be (velocity of sound in air is $330m/s$)

A. 109 vib / sec

B. 132 vib / sec

C. 140 vib / sec

D. 248 vib / sec

Answer: C

Watch Video Solution

28. A source of sound of frequency n is moving towards a stationary observer with a speed S. If the speed of sound in air is V and the frequency heard by the observer is n_1 ,the value of n_1 / n is

A. $(V+S)/V$

B. $V/(V+S)$

C. $(V-S)/V$

D. $V/(V-S)$

Answer: D

Watch Video Solution

29. 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

Watch Video Solution

30. A whistle giving out $450H_Z$ approaches a stationary observer at a speed of $33m/s$. The frequency heard the observer (in H_Z) is (speed of sound $= 330m/s$)

A. 409

B. 429

C. 517

D. 500

Answer: D

Watch Video Solution

31. An observer is moving away from source of sound of frequency 100 Hz. His speed is 33 m/s. If speed of sound is 330 m/s, then the observed frequency is

A. 90 Hz

B. 100 Hz

C. 91 Hz

D. 110 Hz

Answer: A

Watch Video Solution

32. An observer standing at station observes frequency $219Hz$ when a train approaches and $184Hz$ when train goes away from him. If velocity of sound in air is $340m/s$, then velocity of train and actual frequency of whistle will be

A. $15.5ms^{-1}, 200Hz$

B. $19.5ms^{-1}, 205Hz$

C. $29.5ms^{-1}, 200Hz$

D. $32.5ms^{-1}, 205Hz$

Answer: C

Watch Video Solution

33. At what speed should a source of sound move so that stationary observer finds the apparent frequency equal to half of the original frequency

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

B. $2v$

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

D. v

Answer: D

Watch Video Solution

34. A boy is walking away from a wall towards an observer at a speed of 1 metre / sec and blows a whistle whose frequency is 680 Hz . The number of beats heard by the observer per second is (Velocity of sound in air = 340 metres / sec

A. Zero

B. 2

C. 8

D. 4

Answer: D

Watch Video Solution

35. 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. 720 Hz

B. 555.5 Hz

C. 550 Hz

D. 500 Hz

Answer: A

Watch Video Solution

36. 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 $2m/s$. If the speed of sound be $330m/s$, what will be the beat frequency heard by the observer?

A. 8

B. 4

C. 6

D. 1

Answer: B

Watch Video Solution

37. A source of sound is travelling with a velocity 40 km / hour towards observer and emits sound of frequency 2000 Hz . If velocity of sound is 1220 km / hour , then what is the apparent frequency heard by an observer

A. 2210 Hz

B. 1920 Hz

C. 2068 Hz

D. 2086 Hz

Answer: C

Watch Video Solution

38. A source of sound and listener are approaching each other with a speed of 40 m / s . The apparent frequency of note produced by the source is 400 cps . Then, its true frequency (in cps) is (velocity of sound in air = 360 m / s)

A. 420

B. 360

C. 400

D. 320

Answer: D

Watch Video Solution

39. A siren emitting sound of frequency 500 Hz is going away from a static listener with a speed of 50 m / sec . The frequency of sound to be heard, directly from the siren, is

A. 434.2 Hz

B. 589.3 Hz

C. 481.2 Hz

D. 286.5 Hz

Answer: A

Watch Video Solution

40. A man sitting in a moving train hears the whistle of the engine. The frequency of the whistle is 600 Hz

A. The apparent frequency as heard by him is smaller than 600 Hz

B. The apparent frequency is larger than 600 Hz

C. The frequency as heard by him is 600 Hz

D. None of the above

Answer: C

Watch Video Solution

41. A source of sound of frequency 500 Hz is moving towards an observer with velocity 30 m/s . The speed of sound is 330 m/s . the frequency heard by the observer will be

A. 550 Hz

B. 458.3 Hz

C. 530 Hz

D. 545.5 Hz

Answer: A

Watch Video Solution

42. A source of sound of frequency 90 vibrations/ sec is approaching a stationary observer with a speed equal to 1/10 the speed of sound. What will be the frequency heard by the observer

A. 80 vibrations/ sec

B. 90 vibrations/ sec

C. 100 vibrations/ sec

D. 120 vibrations/ sec

Answer: C

Watch Video Solution

43. A whistle of frequency 500 Hz tied to the end of a string of length 1.2 m revolves at 400 rev / min . A listener standing some distance away in the plane of rotation of whistle hears frequencies in the range (speed of sound = 340 m / s)

A. 436 to 586

B. 426 to 574

C. 426 to 584

D. 436 to 674

Answer: A

Watch Video Solution

44. A train moves towards a stationary observer with speed $34m/s$. The train sounds a whistle and its frequency registered by the observer is f_1. If the train's speed is reduced to $17m/s$, the frequency registered is f_2. If the speed of sound of $340m/s$, then the ratio $f_1/f_2$is

A. $18/19$

B. $1/2$

C. 2

D. $19/18$

Answer: D

Watch Video Solution

45. If source and observer both are relatively at rest and if speed of sound is increased then frequency heard by observer will

A. Increases

B. Decreases

C. Can not be predicted

D. Will not change

Answer: D

Watch Video Solution

46. A source and an observer move away from each other with a velocity of 10 m/s with respect to ground. If the observer finds the frequency of sound coming from the source as 1950 Hz , then actual frequency of the source is (velocity of sound in air = 340 m/s)

A. 1950 Hz

B. 2068 Hz

C. 2132 Hz

D. 2486 Hz

Answer: B

Watch Video Solution

47. A source is moving towards an observer with a speed of 20 m / s and having frequency of 240 Hz . The observer is now moving towards the source with a speed of 20 m / s . Apparent frequency heard by observer, if velocity of sound is 340 m / s , is

A. 240 Hz

B. 270 Hs

C. 280 Hz

D. 360 Hz

Answer: B

Watch Video Solution

48. A siren placed at a railway platform is emitting sound of frequency $5kHz$. A passenger sitting in a moving train A records a frequency of $5.5kHz$ while the train approaches the siren. During his return journey in a different train B he records a frequency of $6.0kHz$ while approaching the same siren. the ratio the velocity of train B to that of train A is

A. $242/252$

B. 2

C. $5/6$

D. $\frac{11}{6}$

Answer: B

Watch Video Solution

49. A whistle revolves in a circle with an angular speed of $20 rad/\sec$ using a string of length $50cm$. 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. 333 Hz

B. 374 Hz

C. 385 Hz

D. 394 Hz

Answer: B

Watch Video Solution

50. A siren emitting sound of frequency $800Hz$ is going away from a static listener with a speed of $30m/s$. frequency of sound to be heard by the listener is: $(\text{velocity of sound} = 330m/s)$

A. 733.3 Hz

B. 644.8 Hz

C. 481.2 Hz

D. 286.5 Hz

Answer: A

Watch Video Solution

Watch Video Solution

51. A car sounding a horn of frequency 1000 Hz passes an observer. The ratio of frequencies of the horn noted by the observer before and after passing of the car is 11 : 9. If the speed of sound is v , the speed of the car is

A. $\frac{1}{10}v$

B. $\frac{1}{2}v$

C. $\frac{1}{5}v$

D. v

Answer: A

Watch Video Solution

52. What should be the velocity of a sound source moving towards a stationary observer so that apparent frequency is double the actual frequency (Velocity of sound is v)

A. v

B. $2v$

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

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

Answer: C

Watch Video Solution

53. Two trains are moving towards each other at speeds of 20 m/s and 15 m/s relative to the ground. The first train sounds a whistle of frequency 600 Hz . the frequency of the whistle heard by a passenger in the second train before the train meets is (the speed of sound in air is 340 m/s)

A. 600 Hz

B. 585 Hz

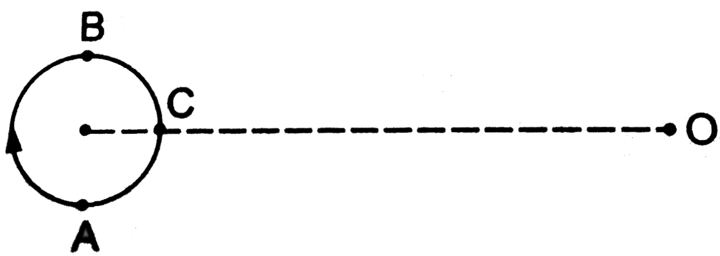
C. 645 Hz

D. 666 Hz

Answer: D

Watch Video Solution

54. A small source of sound moves on a circle as shown in figure and an observer is sitting at O. Let v_1, v_2, v_3 be the frequencies heard when the source is at A,B and C respectively.



A. $n_1 > n_2 > n_3$

B. $n_2 > n_3 > n_1$

C. $n_1 = n_2 > n_3$

D. $n_2 > n_1 > n_3$

Answer: B

Watch Video Solution

55. A source and an observer approach each other with same velocity 50 m/s . If the apparent frequency is $435 \sec^{-1}$, then the real frequency is

A. 320 s

B. 360 sec

C. 390 sec

D. 420 sec

Answer: A

Watch Video Solution

Watch Video Solution

56. A source emits a sound of frequency of 400 Hz , but the listener hears it to be 390 Hz . Then

A. The listener is moving towards the source

B. The source is moving towards the listener

C. The listener is moving away from the source

D. The listener has a defective ear

Answer: C

Watch Video Solution

57. Doppler effect is applicable for

A. Moving bodies

B. One is moving and other are stationary

C. For relative motion

D. None of these

Answer: C

Watch Video Solution

58. A source and an observer are moving towards each other with a speed equal to $\frac{v}{2}$ where v is the speed of sound. The source is emitting sound of frequency n . The frequency heard by the observer will be

A. Zero

B. n

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

D. $3n$

Answer: D

Watch Video Solution

59. When an engine passes near to a stationary observer then its apparent frequencies occurs in the ratio 5/3. if the velocity of sound is 340 m/s then speed of engine is

A. 540 m/s

B. 270 m/s

C. 85 m/s

D. 52.5 m/s

Answer: C

Watch Video Solution

60. A police car horn emits a sound at a frequency 240 Hz, when the car is at rest. If the speed of the sound is 330 m/s the frequency heard by an observer who is approching the car at a speed of 11 m/s is

A. 248 Hz

B. 244 Hz

C. 240 Hz

D. 230 Hz

Answer: A

Watch Video Solution

61. A person carrying a whistle emitting continuously a note of $272Hz$ is runnig towards a reflecting surface with a speed of $18km/h$. The speed of sound in air is $345ms^{-1}$ The number of beats heard by him is

A. 4

B. 6

C. 8

D. 3

Answer: C

Watch Video Solution

62. A car is moving with a velocity of $5m/s$ towards huge wall. The driver sounds a horn of frequency $165Hz$. If the speed of sound in air is $335m/s$, the number of beats heard per second by the driver is

A. 6

B. 5

C. 3

D. 4

Answer: B

Watch Video Solution

Watch Video Solution

63. A source of sound of frequency $256Hz$ is moving rapidly towards wall with a velocity of $5m/\sec$. How many beats per second will be heard if sound travels at a speed of $330m/\sec$.

A. 7.8 Hz

B. 7.7 Hz

C. 3.9 Hz

D. Zero

Answer: A

Watch Video Solution

64. Thw apparent frequency of a note, when a listener moves towards a stationary source, with velocity of $40m/s$ is $200Hz$. When he moves away from the same source with the same speed, the apparent frequency of the same note is $160Hz$. The velocity of sound is air is (in m/s)

A. 360

B. 330

C. 320

D. 340

Answer: A

Watch Video Solution

65. 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. 5%

B. 20%

C. Zero

D. 0.5%

Answer: B

Watch Video Solution

Musical Sound

1. The walls of the halls built for music concerts should

A. Amplify sound

B. Transmit sound

C. Reflect sound

D. Absorb sound

Answer: D

Watch Video Solution

Watch Video Solution

2. A spherical source of power $4W$ and frequency $800Hz$ is emitting sound waves. The intensity of waves at a distance $200m$ is

A. $8 \times 10^{-6} W/m^2$

B. $2 \times 10^{-4} W/m^2$

C. $1x10^{-4} W/m^2$

D. $4W/m^2$

Answer: A

Watch Video Solution

3. If the pressure amplitude in a sound wave is tripled, then by what factor the intensity of sound wave is increased?

A. 9

B. 3

C. 6

D. $\sqrt{3}$

Answer: A

Watch Video Solution

4. If the displacement amplitude of sound is doubled and the frequency reduced to one-fourth, the intensity will become

A. Increased by a factor of 2

B. Decreased by a factor of 2

C. Decreased by a factor of 4

D. Unchanged

Answer: C

Watch Video Solution

5. Intensity level of intensity l is 30 dB. The ratio $\frac{I}{I_0}$ is (where I_0 is the threshold of hearing)

A. 3000

B. 1000

C. 300

D. 30

Answer: B

Watch Video Solution

6. Decibel is unit of

A. Intensity of light

B. X-rays radiation capacity

C. Sound loudness

D. Energy of radiation

Answer: C

Watch Video Solution

7. Quality of a musical note depends on

A. Harmonics present

B. Amplitude of the wave

C. Fundamental frequency

D. Velocity of sound in the medium

Answer: A

Watch Video Solution

8. When we hear a sound, we can identify its source from

A. Amplitude of sound

B. Intensity of sound

C. Wavelength of sound

D. Overtones present in the sound

Answer: D

Watch Video Solution

9. A man x can hear only upto 10 kHz and another man y upto 20 kHz . A note of frequency 500 Hz is produced before them from a stretched string. Then

A. Both will hear sounds of same pitch but different quality

B. Both will hear sounds of different pitch but same quality

C. Both will hear sounds of different pitch and different quality

D. Both will hear sounds of same pitch and same quality

Answer: D

Watch Video Solution

10. The amplitude of two waves are in ratio 5 : 2. If all other conditions for the two waves are same, then what is the ratio of their energy densities

A. $5:2$

B. $10:4$

C. $2.5:1$

D. $25:4$

Answer: D

Watch Video Solution

11. A is singing a note and at the same time B is singing a note with exactly one eighth the frequency of the note of A. The energies of two sounds are equal, the amplitude of the note of B is

A. Same that of A

B. Twice as that of A

C. Four times as that of A

D. Eight times as that of A

Answer: D

Watch Video Solution

12. The loudness and the pitch of a sound depends on

A. Intensity and velocity

B. Frequency and velocity

C. Intensity and frequency

D. Frequency and number of harmonics

Answer: C

Watch Video Solution

13. If T is the reverberation time of an auditorium of volume V then

A. $T \propto \frac{1}{V}$

B. $T \propto \frac{1}{V^2}$

C. $T \propto V^2$

D. $T \propto V$

Answer: D

Watch Video Solution

14. The intensity of sound from a radio at a distance of 2 metres from its speaker is $1 \times 10^{-2} \mu W / m^2$. The intensity at a distance of 10 meters would be

A. $0.2 \times 10^{-2} \mu W / m^2$

B. $1 \times 10^{-2} \mu W / m^2$

C. $4 \times 10^{-4} \mu W / m^2$

D. $5 \times 10^{-2} \mu W / m^2$

Answer: C

Watch Video Solution

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

A. 70 decibel

B. 72.9 decibel

C. 81 decibel

D. 60 decibel

Answer: B

Watch Video Solution

16. A musical scale is constructed by providing intermediate frequencies between a note and its octave which

A. Form an arithmetic progression

B. Form a geometric progression

C. Bear a simple ratio with their neighbours

D. Form a harmonic progression

Answer: C

Watch Video Solution

17. In a harmonium the intermediate notes between a note and its octave form

A. An arithmetic progression

B. A geometric progression

C. A harmonic progression

D. An exponential progression

Answer: B

View Text Solution

18. (a) The power of sound from the speaker of a radio is 20 mW. By turning the knob of volume control the power of sound is increased to 400 mW, What is the power increase in dB as compared to original power? (b) How much more intense is an 80 dB sound than a 20 dB whisper?

A. 13 dB

B. 10 dB

C. 20 dB

D. 800 dB

Answer: A

Watch Video Solution

19. If separation between screen and source is increased by 2% what would be the effect on the intensity

A. Increases by 4%

B. Increases by 2%

C. Decreases by 2%

D. Decreases by 4%

Answer: D

Watch Video Solution

20. The musical interval between two tones of frequencies $320Hz$ and $240Hz$ is

A. 80

B. $\left(\frac{4}{3}\right)$

C. 560

D. 320×240

Answer: B

Watch Video Solution

21. In an orchestra, the musical sounds of different instruments are distinguished from one another by which of the following characteristics.

A. Pitch

B. Loudness

C. Quality

D. Overtones

Answer: C

Watch Video Solution

Watch Video Solution

22. The intensity ratio of two waves is $1:16$. The ratio of their amplitudes is

A. $1:4$

B. $1:2$

C. $1:10$

D. $1:2.2$

Answer: D

Watch Video Solution

23. It is possible to recognise a person by hearing his voice even if he is hidden behind a wall. This is due to the fact that his voice

A. Has a definite pitch

B. Has a definite quality

C. Has a definite loudness

D. Can penetrate the wall

Answer: B

Watch Video Solution

24. Of the following, the one which emits sound of higher pitch is :

A. Mosquito

B. Lion

C. Man

D. Woman

Answer: A

Watch Video Solution

25. In the musical octave 'Sa', 'Re', 'Ga'

A. The frequency of the note 'Sa' is greater than that of 'Re', 'Ga'

B. The frequency of the note 'Sa' is smaller than that of 'Re', 'Ga'

C. The frequency of all the notes 'Sa', 'Re', 'Ga' is the same

D. The frequency decreases in the sequence 'Sa', 'Re', 'Ga'

Answer: B

View Text Solution

26. Tone A has frequency of 240 Hz. Of the following tones, the one which will sound least harmonious with A is

A. 240

B. 480

C. 360

D. 450

Answer: D

View Text Solution

27. Learned Indian classical vocalists do not like the accompaniment of a harmonium because

A. Intensity of the notes of the harmonium is too large

B. Notes of the harmonium are too shrill

C. Diatonic scale is used in the harmonium

D. Tempered scale is used in the harmonium

Answer: D

View Text Solution

28. Each of the properties of sound listed in column A primarily depends on one of the quantities in column B. Choose the matching pairs from two columns

Column A	Column B
Pitch	Waveform
Quality	Frequency
Loudness	Intensity

A. Pitch-waveform, Quality-frequency, Loudness-intensity

B. Pitch-frequency, Quality-waveform, Loudness-intensity

C. Pitch-intensity, Quality-waveform, Loudness- frequency

D. Pitch-waveform, Quality- intensity, Loudness-frequency

Answer: B

Watch Video Solution

29. The sound level at a distance of 3.00 m from a source is 120 dB. At what distance will the sound level be (a) 100 dB and (b) 10.0 dB?

A. Zero

B. 54 dB

C. 64 dB

D. 44 dB

Answer: B

Watch Video Solution

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

Watch Video Solution

31. Quality depends on

A. Intensity

B. Loudness

C. Timbre

D. Frequency

Answer: D

Watch Video Solution

32. Two waves having sinusoidal waveforms have different wavelengths and different amplitude. They will be having

A. Same pitch and different intensity

B. Same quality and different intensity

C. Different quality and different intensity

D. Same quality and different pitch

Answer: A

Watch Video Solution

Critical Thinking Questions

1. A wave disturbance in a medium is described by $y(x, t) = 0.02\cos\left(50\pi t + \frac{\pi}{2}\right)\cos(10\pi x)$ where x and y are in metre and t is in second . Which of the following is correct ?

A. A displacement node occurs at x = 0.15 m

B. An antinode occurs at $x = 0.3m$

C. The wavelength of the wave is 0.2 m

D. The speed of the wave is 5.0 m/s

Answer: A::B::C::D

Watch Video Solution

2. The (x, y) co-ordinates of the corners of a square plate are $(0, 0)$, (L, L) and $(0, L)$. The edges of the plate are clamped and transverse standing waves are set up in it. If $u(x, y)$ denotes the displacement of the plate at the point (x, y) at some instant of time, the possible expression (s) for u is (are) $(a = positivecons\tan t)$

A. $a\cos\left(\frac{\pi x}{2L}\right)\cos\left(\frac{\pi y}{2L}\right)$

B. $a\sin\left(\frac{\pi x}{L}\right)\sin\left(\frac{\pi y}{L}\right)$

C. $a \sin\left(\frac{\pi x}{L}\right) \sin\left(\frac{2\pi y}{L}\right)$

D. $a \cos\left(\frac{2\pi x}{L}\right) \cos\left(\frac{\pi y}{L}\right)$

Answer: B::C

Watch Video Solution

3. The ends of a stretched wire of length L are fixed at $x = 0$ and $x = L$. In one experiment, the displacement of the wire is $y_1 = A \sin(\pi / L) \sin \omega t$ and energy is E_1 and in another experiment its displacement is $y_2 = A \sin(2\pi x / L) \sin 2\omega t$ and energy is E_2. Then

A. $E_2 = E_1$

B. $E_2 = 2E_1$

C. $E_2 = 4E_1$

D. $E_2 = 16E_1$

Answer: C

Watch Video Solution

4. In a large room, a person receives direct sound waves froma source 120 metres away from him. He also receives waves from the same source which reach him, being reflected from the 25 metre high ceiling at a point halfway between them. The two waves interfere constuctively for wavelength of

A. 20, 20/3, 20/5 etc

B. 10, 5, 2.5 etc

C. 10, 20, 30 etc

D. 15, 25, 35 etc

Answer: A::B::C::D

Watch Video Solution

5. A train has just completed a U-curve in a trach which is a semi circle. The engine is at the forward end of the semi circular part of the trach while the last carriage is at the rear end of the semi circular track. The driver blows a whistle of frequency 200 Hz. Velocity of sound is $340\frac{m}{s}$. Then the apparent frequency as observed by a passenger in the middle of the train, when the speed of the train is 30 m/s, is

A. 209 Hz

B. 288 Hz

C. 200Hz

D. 181 Hz

Answer: C

Watch Video Solution

6. Two identical flutes produce fundamental notes of frequency $300Hz$ at $27^{\circ} C$. If the temperature of air in one flute is increased to $31^{\circ} C$, the number of the beats heard per second will be

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

7. In the experiment for the determination of the speed of sound in air using the resonance column method, the length of the air column that resonates in the fundamental mode, with a tuning fork is $0.1m$.

When this length is changed to $0.35m$, the same tuning fork resonates with the first overtone. Calculate the end correction.

A. 0.012 m

B. 0.025 m

C. 0.05 m

D. 0.024 m

Answer: B

Watch Video Solution

8. A closed organ pipe of length L and an open organ pipe contain gass of densities ρ_1 and ρ_2, respectively. The compressibility of gass are equal in both the pipes. Both the pipes are vibrating in their first overtone with same frequency . The length of the open orange pipe is

(a) $\frac{L}{3}$

$\frac{4l}{3}$

(c) $\frac{4l}{3}\sqrt{\frac{\rho_1}{\rho_2}}$

(d) $\frac{4l}{3}\sqrt{\frac{\rho_2}{\rho_1}}$

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

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

C. $\frac{4L}{3}\sqrt{\frac{\rho_1}{\rho_2}}$

D. $\frac{4L}{3}\sqrt{\frac{\rho_2}{\rho_1}}$

Answer: C

Watch Video Solution

9. A string of length $0.4m$ and mass $10^{-2}kg$ is clamped at one end . The tension in the string is $1.6N$. The identical wave pulses are generated at the free end after regular interval of time , Δt . The minimum value of Δt , so that a constructive interference takes place between successive pulses is

A. 0.05 s

B. 0.10 s

C. 0.20 s

D. 0.40 s

Answer: B

Watch Video Solution

10. Two identical stringed instruments have frequency 100 Hz . If tension in one of them is increased by 4% and they are sounded together then the number of beats in one second is

A. 1

B. 8

C. 4

D. 2

Answer: D

Watch Video Solution

11. The difference between the apparent frequency of a sound of soun as perceived by an observer during its approach and recession is 2% of the natural frequency of the source. If the velocity of sound in air is $300m/s$, the velocity of the source is (It is given that velocity of source `ltlt velocity of sound)

A. $6m/\sec$

B. $3m/\sec$

C. $1.5m/\sec$

D. $12m/\sec$

Answer: B

Watch Video Solution

12. A sound wave of frequency f travels horizontally to the right. It is reflected from a large vertical plane surface moving to left with a speed v. The speed of sound in medium is C

A. The frequency of the reflected wave is $\frac{v(c+v)}{c-v}$

B. The wavelength of the reflected wave is $\frac{c(c-v)}{v(c+v)}$

C. The number of waves striking the surface per second is $\frac{v(c+v)}{c}$

D. The number of beats heard by a stationary listener to the left of the reflecting surface is $\frac{vv}{c-v}$

Answer: A::B::C

Watch Video Solution

13. Two cars are moving on two perpendicular roads towards a crossing with uniform speeds of $72\frac{km}{h}$ and $36\frac{km}{h}$. If second car blows horn of frequency 280 Hz, then the frequency of horn heard by the driver of first car when the line joining the cars makes angle of $45^\circ C$ with the roads, will be (velocity of sound is $330\frac{m}{s}$)

A. 321 Hz

B. 298 Hz

C. 289 Hz

D. 280 Hz

Answer: B

Watch Video Solution

14. Two whistles Aand B produces notes of frequencies 660 Hz and 596 Hz respectively. There is a listener at the mid- point of the line joining them. Now the whistle 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

15. A source producing sound of frequency 170 Hz is approaching a stationary observer with a velocity $17ms^{-1}$. The apparent change in the wavelength of sound heard by the observer is (speed of sound in air $= 340ms^{-1}$)

A. 0.1 m

B. 0.2 m

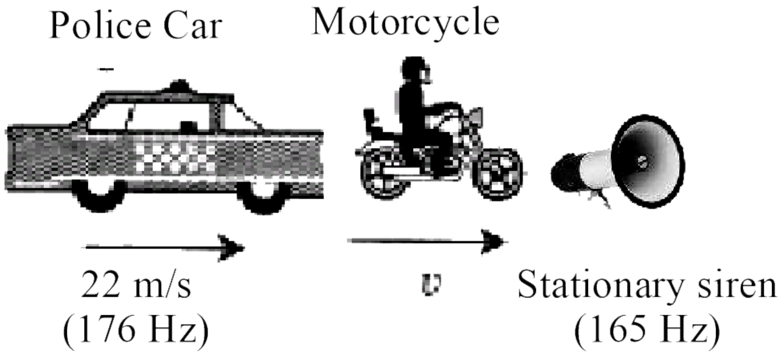
C. 0.4 m

D. 0.5 m

Answer: A

Watch Video Solution

16. A police car moving at 22 m/s, chases a motorcylist. The police man sounds his horn at 176 Hz, while both of them move towards a stationary siren of frequency 165 Hz. Calculate the speed of the motorcycle, if it is given that he does not observes any beats



A. 33 m/s

B. 22 m/s

C. Zero

D. 11 m/s

Answer: B

Watch Video Solution

17. 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. $1.2f, \lambda$

B. $f, 1.2\lambda$

C. $0.8f, 0.8\lambda$

D. $1.2f, 1.2\lambda$

Answer: A

Watch Video Solution

18. A light pointer fixed to one prong of a tuning fork touches gnetly a smoked vertical plate. The fork is set vibrating and the plate is allowed to fall freely. 8 complete oscilllations are counted when the plate falls through 10cm.What is the frequency of the tuning fork?

A. 360 Hz

B. 280 Hz

C. 560 Hz

D. 56 Hz

Answer: D

Watch Video Solution

19. Oxygen is 16 times heavier than hydrogen. At NTP equal volumn of hydrogen and oxygen are mixed. The ratio of speed of sound in the mixture to that in hydrogen is

A. $\sqrt{\frac{1}{8}}$

B. $\sqrt{\frac{32}{17}}$

C. $\sqrt{8}$

D. $\sqrt{\frac{2}{17}}$

Answer: A

Watch Video Solution

20. The equation of displacement of two waves are given as

$$y_1 = 10\sin\left(3\pi t + \frac{\pi}{3}\right), y_2 = 5\left[\sin 3\pi t + \sqrt{3}\cos 3\pi t\right]$$

Then what is the ratio of their amplitudes

A. $1:2$

B. $2:1$

C. $1:1$

D. None of these

Answer: C

Watch Video Solution

21. The equation $y = A\cos^2\left(2\pi nt - 2\pi\frac{x}{\lambda}\right)$ represents a wave with

A. Amplitude A/2, frequency 2n and wavelength $\lambda/2$

B. Amplitude A/2, frequency 2n and wavelength λ

C. Amplitude A , frequency 2n and wavelength 2λ

D. Amplitude A , frequency n and wavelength λ

Answer: A

Watch Video Solution

22. In a wave motion $y = \sin(kx - \omega t)$, y can represent :-

A. Electric field

B. Magnetic field

C. Displacement

D. Pressure

Answer: A::B::C::D

Watch Video Solution

23. There are 10 sound sources each producing intensity I at a point independently. The are incoherent. Average intensity of sound at that point will be:

A. $I = 100I_0$

B. $I = 10I_0$

C. $I = I_0$

D. $I = \sqrt{10}I_0$

Answer: B

Watch Video Solution

24. Ten tuning forks are arranged in increasing order of frequency is such a way that any two nearest tuning forks produce $4be * / \sec$. The highest freqeuncy is twice of the lowest. Possible highest and the lowest frequencies are

A. 80 and 40

B. 100 and 50

C. 44 and 22

D. 72 and 36

Answer: D

Watch Video Solution

25. Forty - one forks are so arranged that each products $5beat / s$ when sounded with its near fork . If the frequency of last fork is double the frequency of first and last fork , respectively are

A. 200, 400

B. 205, 410

C. 195, 390

D. 100, 200

Answer: A

Watch Video Solution

26. Two identical wires have the same fundamental frequency of 400 Hz . when kept under the same tension. If the tension in one wire is increased by 2% the number of beats produced will be

A. 4

B. 2

C. 8

D. 1

Answer: A

Watch Video Solution

27. 25 tunning forks are arranged in series in the order of decreasing frequency. Any two successive forks produce 3 beats/sec. If the frequency of the first turning fork is the octave of the last fork, then the frequency of the 21st fork is

A. 72 Hz

B. 288 Hz

C. 84 Hz

D. 87 Hz

Answer: C

Watch Video Solution

28. 16 tuning forks are arranged in increasing order of frequency. Any two consecutive tuning forks when sounded together produce 8 beats per second. If the frequency of last tuning fork is twice that of first, the frequency of first tuning fork is :-

A. 120

B. 160

C. 180

D. 220

Answer: A

Watch Video Solution

29. Two idential straight wires are stretched so as to produce 6 beats per second when vibrating simultaneously. On changing the tension slightly in one of them, the beat frequency remains unchanged.

Denoting by T_1, T_2 the higher and the lower initial tension in the strings, then it could be said that while making the above changes in tension,

A. T_2 was decreased

B. T_2 was increased

C. T_1 was increased

D. T_1 was kept constant

Answer: B

Watch Video Solution

30. The frequency of a stretched uniform wire under tension is in resonance with the fundamental frequency of a closed tube. If the tension in the wire is increased by 8 N , it is in resonance with the first overtone of the closed tube. The initial tension in the wire is

A. 1N

B. 4N

C. 8N

D. 16 N

Answer: A

Watch Video Solution

31. A metal wire of linear mass density of $9.8g/m$ is stretched with a tension of $10kg-wt$ between two rigid support $1meter$ apart. The wire passes at its middle point between the poles of a permanent magnet, and it vibrates in resonance when carrying an alternating current of frequency n. the frequency n of the alternating source is

A. 25 Hz

B. 50 Hz

C. 100 Hz

D. 200 Hz

Answer: B

Watch Video Solution

32. A wire of density $9 \times 10^3 kg/m^3$ is stretched between two clamps 1 m apart and is subjected to an extension of $4.9 \times 10^{-4} m$. The lowest frequency of transverse vibration in the wire is $(Y = 9 \times 10^{10} N/m^2)$

A. $40 Hz$

B. $35 Hz$

C. $30 Hz$

D. $25 Hz$

Answer: B

Watch Video Solution

33. A man is watching two trains, one leaving and the other coming in with equal speed of 4 m/s. If they sound their whistles, each of frequency 240 Hz, the number of beats heard by the man (velocity of sound in air is $320\frac{m}{s}$) will be equal to

A. 6

B. 3

C. 0

D. 12

Answer: A

Watch Video Solution

34. An open pipe is in resonance in $2nd$ harmonic with frequency f_1. Now one end of the tube is closed and frequency is increased to f_2 such that the resonance again ocuurs in nth harmonic. Choose the correct option

A. $n = 3, f_2 = \frac{3}{-4} f_1$

B. $n = 3, f_2 = \frac{5}{4} f_1$

C. $n = 5, f_2 = \frac{5}{4} f_1$

D. $n = 5, f_2 = \frac{3}{4} f_1$

Answer: C

Watch Video Solution

35. Two speakers connected to the same source of fixed frequency are placed 2.0m apart in a box. A sensitive microphone placed at a distance of 4.0 m from their midpoint along the perpendicular bisector shows maximum response. The box is slowly rotated until the speakers are in line with the microphone. The distance between the midpoint of the speakers and the microphone remains unchanged. Exactly five maximum responses are observed in the microphone in doing this. the wavelength of the sound wave is

A. $0.2m$

B. $0.4m$

C. $0.6m$

D. $0.8m$

Answer: B

Watch Video Solution

36. A wire of $9.8 \times 10^{-3} k \frac{g}{m}$ passes over a frictionless light pulley fixed on the top of a frictionless inclined plane which makes an angle of 30° with the horizontal. Masses m and M are tied at the two ends of wire such that m rests on the plane and M hangs freely vertically downwards. the entire system is in equilibrium and a transverse wave propagates along the wire with a velocities of $100m/s$.

A. $m=20kg$

B. $m=5kg$

C. $m=2kg$

D. $m=7kg$

Answer: A

Watch Video Solution

37. A man standing in front of a mountain beats a drum at regular intervals. The drumming rate is gradually increased and he finds that echo is not heard distinctly when the rate becomes 40 per minute. He then moves near to the mountain by 90 metres and finds that echo is again not heard distinctly when the drumming rate becomes 60 per minute. Calculate (a) the distance between the mountain and the initial position of the man and (b) the velocity of sound.

A. 205 m

B. 300 m

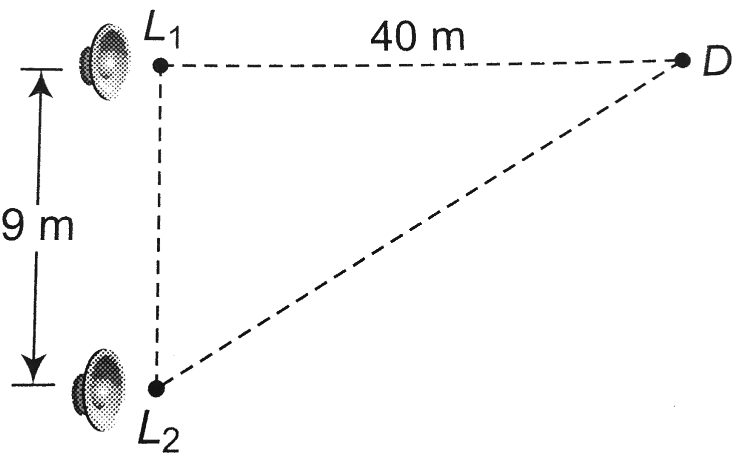
C. 180 m

D. 270 m

Answer: D

Watch Video Solution

38.



Two loudspeakers L_1 and L_2 driven by a common oscillator and amplifier, are arranged as shown. The frequency of the oscillator is gradually increased from zero and the detector at D records a series of maxima and minima. If the speed of sound is $330 ms^{-1}$ then the frequency at which the first maximum is observed is

A. 165 Hz

B. 330 Hz

C. 496 Hz

D. 660 Hz

Answer: B

Watch Video Solution

39. The amplitude of a wave disturbance propagating in the positive x-direction is given by $y = \frac{1}{((1+x))^2}$ at time $t = 0$ and by $y = \frac{1}{\left[1+(x-1)^2\right]}$ at $t = 2 \sec onds$, x and y are in meters. The shape of the wave disturbance does not change during the propagation. The velocity of the wave is .... m//s`.

A. 0.5

B. 1

C. 2

D. 4

Answer: A

Watch Video Solution

40. A person speaking normally produces a sound intensity of $40 dB$ at a distance of $1 m$. If the threshold intensity for reasonable audibility is $20 dB$, the maximum distance at which he can be heard cleary is.

A. 4m

B. 5m

C. 10 m

D. 20 m

Answer: C

Watch Video Solution

41. A string of length L and mass M hangs freely from a fixed point. Then the velocity of transverse waves along the string at a distance x from the free end is

A. $\sqrt{gL}$

B. $\sqrt{gx}$

C. gL

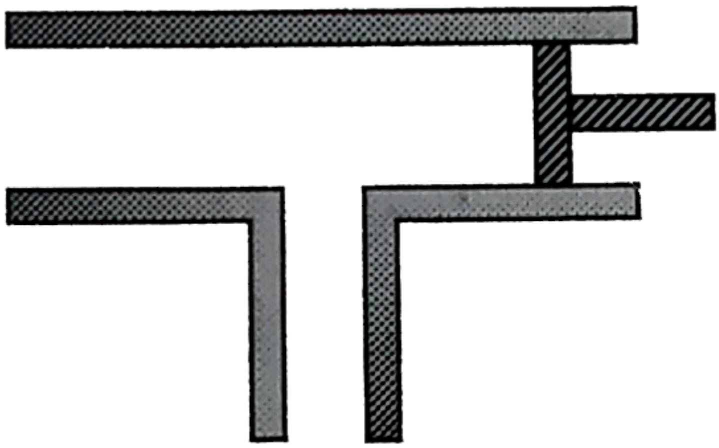
D. gx

Answer: B

Watch Video Solution

42. Vibrating tuning fork of frequency n is placed near the open end of a long cylindrical tube. The tube has a side opening and is fitted with a movable reflecting piston. As the piston is moved through $8.75cm$, the intensity of sound changes from a maximum to minimum.

If the speed of sound is $350 m / s$. Then n is



A. 500 Hz

B. 1000 Hz

C. 2000 Hz

D. 4000 Hz

Answer: B

Watch Video Solution

43. A stone is hung in air from a wire which is stretched over a sonometer. The bridges of the sonometer are L cm apart when the wire is in unison with a tuning fork of frequency N . When the stone is completely immersed in water, the length between the bridges is l cm for re-establishing unison, the specific gravity of the material of the stone is

A. $\dfrac{L^2}{L^2 + l^2}$

B. $\dfrac{L^2 - l^2}{L^2}$

C. $\dfrac{L^2}{L^2 - l^2}$

D. $\dfrac{L^2 - l^2}{L^2}$

Answer: C

Watch Video Solution

44. The displacement of partcles in a string streched in the x-direction is by y. Among the following expressions for y, those describing wave motion are :

A. $\cos kx \sin \omega t$

B. $k^2x^2 - \omega^2t^2$

C. $\cos(kx + \omega t)$

D. $\cos\left(k^2x^2 - \omega^2t^2\right)$

Answer: A::C

Watch Video Solution

45. Three waves of equal frequency having amplitudes $10\mu m$, $4\mu m$, $7\mu m$ arrive at a given point with successive phase difference of $\pi/2$, the amplitude of the resulting wave in μm is given by

A. 7

B. 6

C. 5

D. 4

Answer: C

Watch Video Solution

46. Three sound sources p,q and r have frequencies 400 Hz, 401 Hz and 402 Hz respectively. Calculate the number of beats nodes per second.

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

47. A tuning fork of frequency $340 H_Z$ is sounded above an organ pipe of length $120 cm$. Water is now slowly poured in it . The minimum height of water column required for resonance is (speed of sound in air = $340 m / s$)

A. 15 cm

B. 25 cm

C. 30 cm

D. 45 cm

Answer: D

Watch Video Solution

48. An organ pipe is closed 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. 14

B. 13

C. 6

D. 9

Answer: C

Watch Video Solution

49. In Melde's experiment, the string vibrates in 4 loops when a 50 gram weight is placed in the pan of weight 15 gram . To make the string to vibrates in 6 loops the weight that has to be removed from the pan is

A. 0.0007 kg wt

B. 0.0021 kg wt

C. 0.036 kg wt

D. 0.0029 kg wt

Answer: C

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50. A racing car moving towards a cliff, sounds its horn. The driver observes that the sound reflected from the cliff has a pitch one octave higher than the actual sound of the horn. If v is the velocity of sound, then the velocity of the car is

A. $v/\sqrt{2}$

B. $v/2$

C. $v/3$

D. $v/4$

Answer: C

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51. An earthquake generates both transverse (S) and longitudinal (P) sound waves in the earth. The speed of S waves is about 4.5 km /s and that of P waves is about 8.0 km/s . A seismograph records P and S waves from an earthquake. The first P wave arrives 4.0 min before the first S wave. The epicenter of the earthquake is located at a distance about

A. 25 km

B. 250 km

C. 2500 km

D. 5000 km

Answer: C

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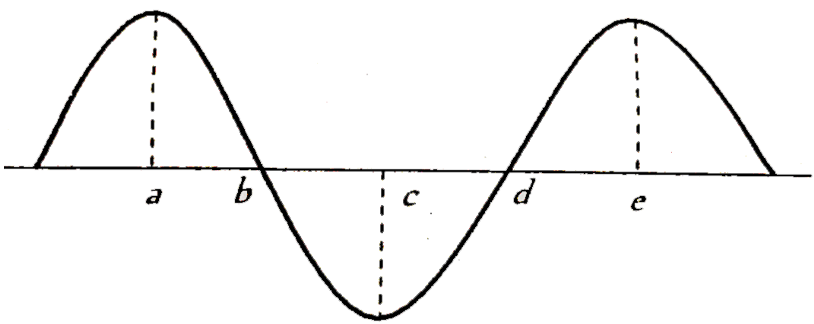
Graphical Quations

1. The rope shown at an instant is carrying a wave travelling towards right, created by a source vibrating at a frequency n . Consider the following statements



I. The speed of the wave is $4n \times ab$

II. The medium at a will be in the same phase as d after $\frac{4}{3n}s$

III. The phase difference between b and e is $\frac{3\pi}{2}$

Which of these statements are correct

A. I, II and III

B. II only

C. I and III

D. III only

Answer: C

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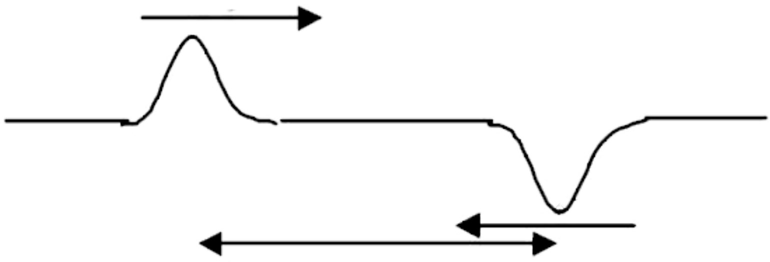
2. Two pulse in a stretched string whose centers are initially $8cm$ apart are moving towards each other as shown in the figure. The speed of each pulse is $2cm / s$. After $2\sec onds$, the total energy of the pulse will be



A. Zero

B. Purely kinetic

C. Purely potential

D. Partly kinetic and partly potential

Answer: B

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3. Assertion: Transverse waves are not produced in liquids and gases.

Reason: Light waves are transverse waves.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

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4. Assertion : Sound waves cannot propagate through vacuum but light waves can.

Reason : Sound waves cannot be polarised but light waves can.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

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5. . Assertion: The velocity of sound increases with increases in humidity.

Reason: Velocity of sound does not depend upon the medium.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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6. Ocean waves hitting a beach are always found to be nearly normal to the shore.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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7. Assertion : Compression and rarefaction involve changes in density and pressure.

Reason : When particles are compressed, density of medium increases and when they are rarefied, density of medium decreases.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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8. Assertion : Transverse waves travel through air in an organ pipe.

Reason : Air possesses only volume elasticity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer: D

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9. Assertion : Sound would travel faster on a not summer day than on a cold winter day,

Reason : Velocity of sound is directly proportional to the square of its aboslute temperature.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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10. Assertion : The basic of Laplace correction was that, exchange of heat between the region of compression and rarefaction in air is not possible.

Reason : Air is a bad conductor of heat and velocity of soundin air is large.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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11. Statement-1 : Particle velocity and wave velocity both are independent of time.

Statement-2 : For the propagation of wave motion, the medium must have the properties of elasticity and inertia.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer: D

Watch Video Solution

12. Assertion : When we start filling an empty bucket with water, the pitch of sound produced goes on decreasing.

Reason : The frequency of man voice is usually higher than of woman.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

Watch Video Solution

13. Assertion : A tuning fork is made of an alloy of steel, nickel and chromium.

Reason : The alloy of steel, nickel and chromium is called elinvar.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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14. Assertion: The change in air pressure effects the speed of sound.

Reason: The speed of sound in gases is proportional to the square of pressure.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer: D

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15. Assertion : Solids, can support both longitudinal and transverse waves but only longitudinal waves can propagate in gases.

Reason : For the proagation of transverse waves, medium must also necessarily have the property of rigidity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

16. Assertion : Under given conditions of pressure and temperature, sound travels faster in a monoatomic gas than in diatomic gas.

Reason : Opposition for wave to travel is more in a monoatomic gas than in diatomic gas.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

Watch Video Solution

17. Assertion : The speed of soun in solids is maximum though density is large.

Reason : The coefficient of elasticity of solid is large.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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Assertion and Reason

1. Assertion : Two persons on the surface of moon cannot talk to each other.

Reason : There is no atmosphere on moon.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

2. Assertion : On a rainy day sound travel slower than on a dry day.

Reason : When moisture is present in air the density of air increases.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

3. Assertion : To hear distinct beats, difference in frequencies of two sources should be less than 10.

Reason : More the number of beats per sec more difficult to hear them.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

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4. Assertion : Sound produced by an open organ pipe is richer than the sound produced by pipe from both ends, in case of oper organ pipe.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

5. Assertion : It is not possible to have interference between the waves produced byu two violins.

Reason : For interferene of two waves the phase differnce between the wave must remain constant.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

6. Assertion : Beats can also be observed by two light sourcesas in sound.

Reason : Light sources have constant phase deference.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

7. Statement-1 : In the case of a stationary wave, a person hear a loud sound at the nodes as compared to the antinodes

Statement-2 : In a stationary wave all the particles of the medium vibrate in phase.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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8. Assertion : Velocity of particles, while crossing mean position (in stationary waves) varies from maximum at antinodes to zero at nodes.Reason:Amplitude of vibration is maximum at antinodes and at nodes amplitude is zero and all the particles between two successive nodes across the mean position together.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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9. Assertion : Where two vibrating tuning forks having frequencies $256Hz$ and $512Hz$ are held near each other, beats cannot be heard.

Reason : The princile of superposition is valid only if the frequencies of the oscillators are nearly equal.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

Watch Video Solution

10. Assertion: The fundamental frequency of an open organ pipe increases as the temperature is increased.

Reason: As the temperature increases, the velocity of sound increases more rapidly than length of the pipe.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

Watch Video Solution

11. Assertion: Sound travels faster in solids than gases.

Reason: Solid possesses greater density than gases.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

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12. Statement 1: Sound waves can not propagate through vacuum but light waves can.

Statement 2: Sound wave can not be polarised but light waves can be.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: D

Watch Video Solution

13. Assertion: Speed of wave $\frac{wavelen > h}{timeperiod}$

Reason: Wavelength is the distance between two nearest particles in phase.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: B

Watch Video Solution

14. Assertion: The flash of lightening is sees before the sound of thunder is heard.

Reason: Speed of sound is greater than speed of light.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: C

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15. Asserion: When a beetle moves along the sand within a few tens of centimeters of a sand scorpion, the scorpion immedeately turn towards the beetle and dashes to it.

Reason: When a beetle disturbs the sand, it sends pulses along the sand surface one set of pulses in londitudinal while other set is transvers.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If the assertion and reason both are false

Answer: A

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16. Assertion : The reverberation time dependent on the the shape of enclosure, position of source and observer.

Reason : The unit of absorption coefficient in mks system is metric sabine.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but re ason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true

Answer: D

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SET

1. An engine is moving on a circular track with a constant speed. It is blowing a whistle of frequency $500Hz$. The frequency received by an observer standing stationary at the centre of the track is

A. $500Hz$

B. More than 500 Hz

C. Less than 500 H

D. More or less than 500 Hz depending on the actual speed of the engine

Answer: A

Watch Video Solution

2. In a resonance tube, the first resonance is obtained when the level of water in the tube is at 16 cm from the open end. Neglecting end correction, the next resonance will be obtained when the level of water from the open end is

A. $24cm$

B. $32cm$

C. $48cm$

D. $64cm$

Answer: C

Watch Video Solution

3. To raise the pitch of a stringed musical instrument the player can

A. Loosen the string

B. Tighten the string

C. Shorten the string

D. Both (b) and (c)

Answer: D

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4. A wave travelling along positive x -axis is given by $y = A\sin(\omega t - kx)$. If it is reflected from rigid boundary such that 80% amplitude is reflected, then equation of reflected wave is

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

B. $y = -0.8A\sin(\omega t + kx)$

C. $y = 0.8A\sin(\omega t + kx)$

D. $y = A\sin(\omega t + 0.8kx)$

Answer: B

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5. The frequency of the first harmonic of a string stretched between two points is 100 Hz . The frequency of the third overtone is

A. $200Hz$

B. $300Hz$

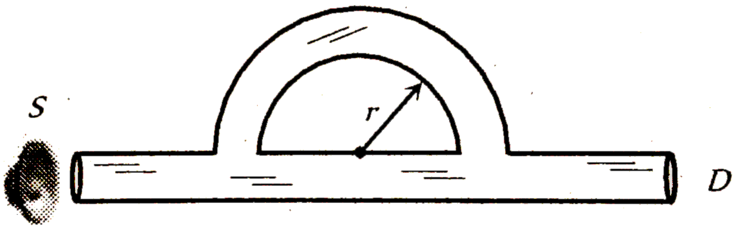
C. $400Hz$

D. $600Hz$

Answer: C

Watch Video Solution

6. A sound wave of wavelength 32 cm enters the tube at S as shown in the figure. Then the smallest radius r so that a minimum of sound is heard at detector D is



A. $7cm$

B. $14cm$

C. $21cm$

D. $28cm$

Answer: B

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7. The length of a sonometer wire between two fixed ends is 110cm. Where should the two bridges the placed so as to divide the wire into three segments, whose fundamental frequencies are in the ration $1:2:3$?

A. $20cm : 30cm : 60cm$

B. $60cm : 30cm : 20cm$

C. $60cm : 20cm : 30cm :$

D. $30cm : 60cm : 20cm$

Answer: B

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8. Unlike a laboratory sonometer, a stringed instrument is seldom plucked in the middle. Supposing a sitar string is plucked at about

$\frac{1}{4}th$ of its length from the end. The most prominent harmonic would be

A. Eighth

B. Fourth

C. Third

D. Second

Answer: D

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

B. $n = \sqrt{n_1 \times n_2 \times n_3 \times \ldots\ldots .}$

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

D. None of these

Answer: C

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10. The equation of stationary wave along a stretched string is given by $y = 5\frac{\sin(\pi x)}{3}\cos 40\pi t$ where x and y are in centimetre and t in second. The separation between two adjacent nodes is :

A. $6cm$

B. $4cm$

C. $3cm$

D. $1.5cm$

Answer: C

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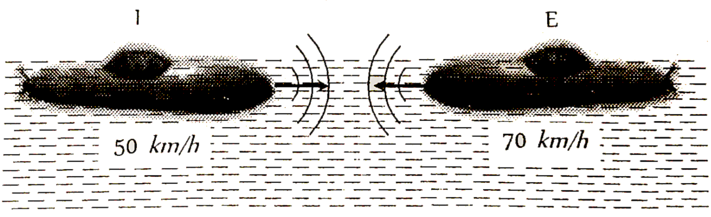
11. An Indian submarine and an enemy submarine move towards each other during maneuvers in motionless water in the Indian ocean. The Indian submarine moves at 50 km/h , and the enemy submarine at 70 km/h . The Indian sub sends out a sonar signal (sound wave in water) at 1000 Hz . Sonar waves travel at 5500 km/h . What is the frequency detected by the Indian submarine



A. $1.02kHz$

B. $2kHz$

C. $2.5kHz$

D. $4.7kHz$

Answer: A

Watch Video Solution

12. Two trains, one coming towards and another going away from an observer both at 4 m/s produce whistle simultaneously of frequency 300 Hz . Find the number of beats produced

A. 5

B. 6

C. 7

D. 12

Answer: C

Watch Video Solution

13. A source of sound emits $200\pi W$ power which is uniformly distributed over a sphere of radius 10 m. What is the loudness of

sound on the surface of the sphere?

A. $200 dB$

B. $200\pi dB$

C. $120 dB$

D. $120\pi dB$

Answer: C

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14. A wave, y (x, t)) $= 0.03 \sin \pi(2t - 0.01x)$ tavels in a medium. Here, x is in metre. The instantaneous phase differenc (in rad) between the two point separated by $25 cm$ is

A. $\frac{\pi}{8}$

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

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

D. π

Answer: B

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15. A sine wave has an amplitude A and wavelength λ. Let V be the wave velocity and v be the maximum velocity of a particle in the medium. Then

A. V = v if $\lambda = \frac{3A}{2\pi}$

B. $V = v$ if $A = 2\pi\lambda$

C. $V = v$ if $A = \frac{\lambda}{2\pi}$

D. V can not be equal to v

Answer: C

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16. A pipe open at both ends produces a note of frequency f_1 . When the pipe is kept with $\frac{4}{3}th$ of its length it water, it produced 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

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17. A man fires a bullet standing between two cliffs. First echo is heard after 3 seconds and second echo is heard after 5 seconds. If the velocity of sound is 330 m/s , then the distance between the cliffs is

A. 1650 m

B. 1320 m

C. 990 m

D. 660 m

Answer: B

Watch Video Solution

18. The equation for spherical progressive wave is (where r is the distance from the source)

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

B. $y = \dfrac{a}{\sqrt{r}}\sin(\omega - kx)$

C. $y = \dfrac{a}{2}\sin(\omega t - kx)$

D. $y = \dfrac{a}{r}\sin(\omega t - kx)$

Answer: D

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19. A tuning fork A produces 4 beats/sec with another tuning fork B of frequency 320 Hz . On filing the fork A , 4 beats/sec are again heard. The frequency of fork A , after filing is

A. 324 Hz

B. 320 Hz

C. 316 Hz

D. 314 Hz

Answer: A

View Text Solution

20. The number of beats produced per second by two vibrations: $x_1 = x_0 \sin 646\pi t$ and $x_2 = x_0 \sin 652\pi t$ is

A. 2

B. 3

C. 4

D. 6

Answer: B

Watch Video Solution

21. Fifty-six tuning forks are arranged in order of increasing frequencies so that each fork gives 4 beats per second with the next one. The last fork gives the octave of the first. Find the frequency of the first.

A. 200 Hz

B. 204 Hz

C. 196 Hz

D. None of these

Answer: C

Watch Video Solution

22. The fundamental of a closed pipe is 220 Hz. If $\frac{1}{4}$ of the pipe is filled with water, the frequency of the first overtone of the pipe now is

A. 200 Hz

B. 440 Hz

C. 880 Hz

D. 1760 Hz

Answer: C

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23. A glass tube $1.5m$ long and open at both ends, is immersed vertically in a water tank completely. A tuning fork of 660 Hz is vibrated and kept at the upper end of the tube and the tube is gradually raised out of water the total number of resonances heard before the tube comes out of water taking velocity of sound air $330m/s$ is

A. 12

B. 6

C. 8

D. 4

Answer: B

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24. In the $5th$ overtone of an open organ pipe, these are (N-stands for nodes and A- for antinodes)

A. 2N, 3A

B. 3N, 4A

C. 4N, 5A

D. 5N, 4A

Answer: C

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25. An engine approaches a hill with a constant speed. When it is at a distance of 0.9 km, it blows a whistle whose echo is heard by the driver after 5 seconds. If the speed of sound in air is 330 m/s, then the speed of the engine is :

A. $10m/s$

B. $20m/s$

C. $30m/s$

D. $40m/s$

Answer: C

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