PHYSICS

BOOKS - TARGET PHYSICS (HINGLISH)

WAVE MOTION

Mcq

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

A. both waves carry energy

B. particles of the medium oscillate

C. longitudinal waves cannot be polarised

D. both waves pass through solids

Answer: C

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2. If the direction of the vibration of particles is parallel to the direction of the propagation of a wave , then the wave is

A. transverse wave

B. Stationary wave

C. longitudinal waves

D. electromagnetic wave

Answer: C

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3. Progressive wave with doubly periodic motion means.

A. from of the wave repeats itself and travel equal distance in equal interval of time.

B. repetition at equal distance

C. repetition after equal intervals of time

D. repetition in medium without inertia.

Answer: A

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4. Choose the WRONG statement.

A. Waves are called progressive waves.If they travel in same straight line.

B. Waves are called progressive waves.If they travel without change of form.

C. Waves are called prograssive waves.If they travel in opposite direction.

D. Waves are called progressive waves.If they are not transverse or longitudinal

Answer: B

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5. Which of the following in NOT the characteristic of the progressive wave?

A. All the vibrating particles of the medium have different amplitudes and frequency

B. State of oscillation change from particles to particle

C. For is propagation,medium has elasticity and inertia

D. The form of wave repeats itself at equal intervals

Answer: A

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6. The equation $y = a \sin 2\pi / \lambda(vt - x)$ is expression for :-

A. A stationary wave of single frequency along x-axis

B. a simple harmonic motion

C. a progressive wave of single frequency along x-axis

D. the resutant of two S.H.M.'s of slightly different frequencies

Answer: C

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7. Dimensions of wavelength of progressive wave is

A. $\left[M^0L^0T^{-1}\right]$

B. $\left[M^0L^{-1}T^0\right]$

C. $\left[M^{-1}L^0T^0\right]$

D. $\left[M^0L^0T^0\right]$

Answer: D

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8. A pulse on the string is inverted when it is reflected from

A. a fixed end

B. a free end

C. both free as well as fixed ends

D. neither a fixed nor a free end.

Answer: A

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9. The transverse waves can propagate through

A. gases but not through metails

B. metals but not through gases 0

C. both gases and metails

D. neither gases nor metals

Answer: B

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10. Longitudinal waves cannot travel through

A. vacuum

B. solids

C. liquids

D. gases

Answer: A

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11. The production of echo is due to

A. reregaction of sound waves

B. interference of sound waves

C. reflection of sound waves

D. refraction of sound waves

Answer: C

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12. A waves undergoes reflection at a rigid wall The parameter changed during this reflection is

A. frequency

B. wavelength

C. amplitude

D. velocity

Answer: D

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13. A wave shown by the eqauction y=A $\cos(\omega t - \phi)$ is totally reflected by a closed end.After reflection

A. ϕ does not change

B. only ϕ change

C. ω changes

D. both ω and ϕ change

Answer: B

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

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

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

C. π

D. 2π

Answer: C

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15. After reflection from the open end a transverse progressive wave $y_1 = A\sin 2\pi(t/T - x/\lambda)$ travels along the direction of negative X-axis The equation of the reflected wave will be

A. $y^2 = A\sin 2\pi(t/T - \lambda/x)$

B. $y^2 = -A\sin 2\pi(t/T + x/\lambda)$

C. $y_2 = A\sin 2\pi(t/T) + x/\lambda)$

D. $y_2 = A\cos 2\pi(t/T - x/\lambda)$

Answer: C

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16. When a wave is reflected at a rarer surface,the change in phase is

A. 0

B. $\pi / 2$

C. π

D. $3\pi / 2$

Answer: A

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17. A phase reversal of π means

A. reversal of wave velocity.

B. there is a reversal of particle velocity

C. there is a reversal of particle as well as the wave velocity

D. there is reversal of medium.

Answer: B

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18. Not only a change in direction but also a phase change of π radian suffered by a sound wave,when it suffers

A. reflection from a denser medium.

B. reflection from a rarer medium

C. reflection in a denser medium

D. reflection in a rarer medium.

Answer: A

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19. The phenomenon of interference is observed when two source have

A. nearly same frequency

B. exactly same wavelength

C. same frequency and constant phase difference

D. same frequency and varying phase difference

Answer: C

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20. A Quincke's tube is used

A. as a sound interferometer

B. as a filter

C. as both interferometer and a filter

D. in transverse wave propagation

Answer: C

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21. In Quincke's tube experiment the difference in amplitudes is due to

A. refraction

B. reflection

C. superposition

D. polarization

Answer: C

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22. The beats are produced by sounding the two tuning forks together.If wax is put on any one of the forks. Then the beat period

A. Increases

B. decreases

C. remain same

D. may decrease, increase or remian the same

Answer: D

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23. To deminstrate the phenimenon of interference, we require two sources which emit radiation

A. nearly the same frequen cy

B. exactly the same fequency

C. exactly the same frequency and have a definte phase relationship

D. exactly the same wavelength

Answer: A

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24. Phenomenon of beats is audible if the difference in the frequency of the sound waves is

A. very large

B. zero

C. more than 20

D. less than 20

Answer: D

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25. Waxing and waning of sound is noticeable if waxing and waning repeats at an interval

A. less than 1/10 s

B. more than 1/10s

C. between 1/10 sec and 1/3 s

D. between 1/3 sec and 1s

Answer: B

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26. When beats are produced by two progressive waves of same amplitude and of nearly same frequencies then the maximum loudness of the resulting sound is n times the loudness of each of the component wave trains. The value of n is

A. two times that corresponding to each wave

B. same as that corresponding to each wave

C. four times that corresponding to each wave

D. eight times that corresponding to each wave

Answer: C

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27. When the beats are produced by vibration of two tunning forks of nearly equal frequencies then the velocity of propagation of beats

A. is less than the velocity of sound

B. is equal to the velocity of sound

C. is more than the velocity of sound

D. depends on the relative frequency

Answer: B

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28. At a place due to beats obtained from two sources of sound

A. waves will always superpose in same phase

B. waves will always superpose in opposite phase

C. the phase difference between waves changes with time

D. the phase difference between waves remains constant

Answer: C

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29. The apparent change in frequency of a sounding source and observer in relative motion is

A. phenomenon of beats

B. Doppler effect

C. stationary waves

D. resonance

Answer: B

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30. Doppler effect is not applicable

A. when the source and observer both are at rest

B. when there is relative motion between source and observer

C. when source is at rest and observer is moving

D. when source is moving and observer is at rest

Answer: A

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31. If the distance between the observer and source decresase with time, then it show that

A. appartment frequency will be less than actual frequency

B. appartment frequency will be greater than actual frequency

C. appartment frequency will be equal to the actual frequency

D. apparent frequencies cannot be noticed

Answer: B

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32. A boy moves away from a steady source of sound at a constant speed the sound he hears will

A. decrease in frequency and intentisity

B. increase in frequency and intentisity

C. decrease in frequency and increase in intensity

D. increase in frequency and decrease in intensity .

Answer: A

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33. Assertion: The whistly of an approaching engine appears to be shriller that that of a receding engine.

Reason :This is due to Doppler effect,which states that if a source of sound approaches the observer the frequency of

sound increase and if the source recedes the observer ,the frequency of sound decreases.

A. Assertion is true,Reason is true, Reason is a correct explanation for Assertion

B. Assertion is true,Reason is true, Reason is a not correct explanation for Assertion

C. Assertion is True ,Reason is False

D. Assertion is False but , Reason is True

Answer: A

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34. Assertion : There will be no Doppler effect,when both the source and listener are at rest and wind alone is blowing

Reason :The blowing wind does not change the distance between the source and listener which is a must for Doppler effect.

A. Assertion is True Reason is True, Reason is a correct explanation for Assertion

B. Assertion is true,Reason is true, Reason is a not correct explanation for Assertion

C. Assertion is True ,Reason is False

D. Assertion is False but , Reason is True

Answer: A

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35. in a plane progaressive harmonic wave particle speed is always less than the wave speed if.

A. amplitude of wave is less than $\frac{\lambda}{2\pi}$

B. amplitude of wave is greater than $\frac{\lambda}{2\pi}$

C. amplitude of wave is less than $\frac{\lambda}{4\pi}$

D. amplitude of wave is greater than $\frac{\lambda}{\pi}$

Answer: A

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36. Which two of the following waves are in the same phase?

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

$y = A\sin(kx - \omega t + \pi)$

$y = A\sin(kx - \omega t + \pi/2)$

$y = A\sin(kx - \omega t + 2\pi)$

A. I and II

B. II and III

C. II and IV

D. I and IV

Answer: D

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37. The given figure shows an incident pulse P reflected from a rigid support

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which one of A , B ,C and D represents the reflected pulse correctly?

A. 

B. 

C. 

Answer: D

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38. What is phase difference,when longitudinal wave is reflected from rigid wall?

A. $0^{\copyright}$

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

C. π^{c}

D. $2\pi^c$

Answer: C

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39. Wavelength of wave is a distance between two particles in phase differing by

A. π

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

C. 2π

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

Answer: C

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40. When a longitudinal wave is incident on a rigid wall.

A. compression is reflected as rerefaction with phase change of 0^0

B. compression is reflected as rarefaction with phase change of 180^0

C. compression is reflected as compression with no phase change

D. compression is reflected as compression with phase change of 180^0

Answer: D

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41. 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. $\sqrt{A_1 + A_2^2 + 2A_1A_2\cos(\beta_1 - \beta\_2)}$

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

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42. A sine wave is travelling ina medium. The minium distance between the two particles, always having same speed is

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

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

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

D. λ

Answer: C

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43. 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: A

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

A. Positive x direction with frequency 1 Hz and wavelength $\lambda = 0.2m$

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

C. negative x direction with frequency 1 Hz

D. Positive x direction with frequency π Hz and wavelength

$\lambda = 0.2m$

Answer: B

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45. Given that $y = A\sin\left[\left(\frac{2\pi}{\lambda}(ct - x)\right)\right]$,where y and x are measured in metres. Which of the following statement is true?

A. The unit of λ^{-1} is same as that of $\frac{2\pi}{\lambda}$

B. The unit of λ is same as that of x but not of A

C. The unit of c is same as that of $\frac{2\pi}{\lambda}$

D. The unit of (ct-x) is same as that of $\frac{2\pi}{\lambda}$

Answer: A

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46. The equation of a plane progressive wave is given by, $y = 3\sin\pi\left(\frac{t}{0.02} - \frac{x}{20}\right)$ .The frequency of the wave is

A. 100 Hz

B. 25 Hz

C. 50 Hz

D. 20 Hz

Answer: A

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47. 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 s. frequency of the wave will be

A. 200 Hz

B. 400 Hz

C. 500 Hz

D. 600 Hz

Answer: B

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48. 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. 10 cm

B. 25 cm

C. 40 cm

D. 60 cm

Answer: A

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

A. 10 cm

B. 2 cm

C. 5 cm

D. 10 cm

Answer: C

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50. 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. 100 Hz,1.7 m ,170 m/s

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

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

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

Answer: B

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51. 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: A

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52. The equation of the progressive wave is y =a $\sin \pi \left(nt - \frac{x}{5} \right)$ the ratio maximum paritcle velocity to wave velocity is

A. $\frac{\pi a}{5}$

B. $\frac{2\pi a}{5}$

C. $\frac{3\pi a}{5}$

D. $\frac{4\pi a}{5}$

Answer: B

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53. The equation of the progressive wave is $Y = 3\sin\left[\pi\left(\frac{1}{3} - \frac{x}{5}\right) + \frac{\pi}{4}\right]$ where x and y are in metre and time in second.Which of the following in correct?

A. velocity V = 1.5 m/s

B. amplitude A =3cm

C. frequency F= 0.2 Hz

D. wavelength $\lambda = 10m$

Answer: B

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54. The equation of a wave is given as $y = 0.07\sin(12\pi x - 3000\pi t)$, where x is in metre and t is in

x,then the correct value is

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

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

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

D. n= 1000,v =250 m/s

Answer: D

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55. The S.H.M.s of two particles are given by

$$y_1 = 10\sin\left[2\pi t + \frac{\pi}{6}\right] \text{ and } y_2 = 5\left[\sin 2\pi t + \sqrt{3}\cos 2\pi t\right]$$

The ratio of their amplitudes is

A. $1:2$

B. $2:1$

C. $1:1$

D. $2:3$

Answer: A

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56. 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

B. 3.6×10^{-6}

C. 3.6×10^{-11}

D. 3.6×10^{-4}

Answer: C

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

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

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

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

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

Answer: D

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58. The electric field part of an electromagnetic wave in a medium is represented by $E_x = 0$,

$Ey = 2.5\frac{N}{C}\cos\left[\left(2\pi \times 10^6 \frac{rad}{m}\right)t - \left(\pi \times 10^{-2}\frac{\text{rad}}{s}\right)x\right], E_z = 0$

The wave is

A. moving along y direction with frequency $2\pi \times 10^6$ Hz and wavelength 200 m

B. moving along x direction with frequency 10^6 Hz and wavelength 100 m

C. moving along x direction with frequency 10^6 Hz and wavelength 200 m

D. moving along -x direction with frequency 10^6 Hz and wavelength 200 m

Answer: D

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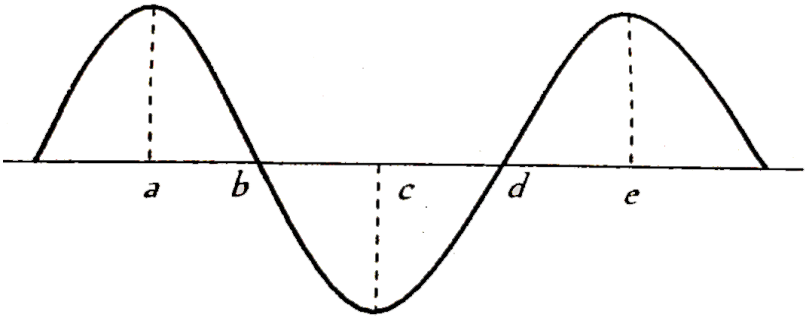
59. The rope shown at an instant is carrying a wave travelling towards right, created by a source vibrating at a frequency n . Consider the following statements



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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60. A prograssive wave is represented by $y = 12\sin(5t - 4x)cm$.On this wave ,how far away are the two points having phase difference of 90° ?

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

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

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

D. $\frac{\pi}{16} cm$

Answer: D

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61. When sound is reflected from a denser medium,

A. crest is reflected as a though

B. crest is reflected as crest

C. compression is reflected as a rarefaction.

D. compression is reflected as a compression

Answer: C

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62. When longitudinal waves are reflected from the surface of a rarer medium?

A. Compression is reflected as rarefactrion without phase change.

B. compression is reflected as rarefaction with phase change of πrad

C. rarefaction is reflected as rarefaction without phase change

D. rarefaction is reflected as rarefaction with a phase change of πrad

Answer: D

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63. 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. $\frac{A}{\sqrt{2}} : \frac{\omega}{2}$

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

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

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

Answer: A

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64. The displacement of the interfaring light waves are $y_1 = 4\sin\omega t$ and $y_2 = 3\sin\left(\omega t + \frac{\pi}{2}\right)$ What is the amplitude

of the resultant wave?

A. 5

B. 7

C. 1

D. 0

Answer: A

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65. Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the same direction.The sum of the maximum and minimum intensities is

A. $\left(\sqrt{I_1} - \sqrt{I_2}\right)^2$

B. $2(I_1 + I_2)$

C. $I_1 + I_2$

D. $\left(\sqrt{I_1} + \sqrt{I_2}\right)^2$

Answer: A

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66. Beats are produced due to

A. diffraction n

B. superposition

C. polarization

D. refraction

Answer: B

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

A. different amplitudes and phases.

B. different velosities

C. different phases

D. different frequencies

Answer: B

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

A. 1

B. 6

C. 12

D. 0

Answer: D

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

A. 360

B. 180

C. 3

D. 60

Answer: B

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70. Two sources of sound placed close to each other are wmitting progressive waves given by $y_1 = 4\sin 600\pi t$ and $y_2 = 5\sin 608\pi t$. An observer located near these two sources of sound will hear:

A. 4 beats per second with intensity ratio 25: 16 between waxing and waning

B. 8 beats per second with intensity ratio 25 : 16 between waxing and waning

C. 8 beats per second with intensity ratio 81 : 1 between waxing and waning

D. 4 beats per second with intensity ratio 81 : 1 between waxing and waning

Answer: B

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71. 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: D

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

A. 306 m/s

B. 331 m/s

C. 340 m/s

D. 360 m/s

Answer: C

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73. When a guitar string is sounded with a 440 Hz tuning fork a beat frequency of 5 Hz is heard if the experiment is repeated with a tuning fork of 437 Hz ,the beat frequency is 8 Hz .The string frequency (Hz) is

A. 445

B. 435

C. 429

D. 448

Answer: A

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74. Two waves $y_1 = 0.25 \sin 316t$ and $y_2 = 0.25 \sin 310t$ are travelling in same direction .The number of beats produced per second will be

A. 6

B. 3

C. $3/\pi$

D. 3π

Answer: A

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75. A tuning fork arrangement (pair) produces $4 beats/\sec$ with one fork of frequency $288 cps$. A little wax is placed on the

unknown fork and it then produces $2 beats / \sec$. The frequency of the unknown fork is

A. 286 c.p.s.

B. 292 c.p.s

C. 294 c.p.s.

D. 288 c.p.s.

Answer: C

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76. Two tuning forks A and B produce 8 beats per second when sounded together ,When B is slightly loaded with wax the beats are reduced to 4 per second .If the frequency of A is 512 Hz,the frequency of B is

A. 508 Hz

B. 516 Hz

C. 504 Hz

D. 520 Hz

Answer: B

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

A. 296 Hz

B. 298 Hz

C. 302 Hz

D. 304 Hz

Answer: D

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78. A tuning fork of known frequency 256 Hz makes 5 beats per second with the vibreting 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+5Hz

B. 256+2Hz

C. 256-2Hz

D. 256-5Hz

Answer: A

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79. Wire having tension 225 N produces six beats per second when it is tuned with a fork. When tension changes to 256 N, it is tuned with the same fork, the number of beats remain unchanged. The frequency of the fork will be

A. 186 Hz

B. 225 Hz

C. 256 Hz

D. 280 Hz

Answer: D

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80. Three sound waves of equal amplitudes have frequencies (n-1) ,n (n+1) .They superimpose to give beats.The number of beats produced per second will be

A. 2

B. 1

C. 4

D. 3

Answer: A

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81. 56 tuning forks are so arranged in series that each fork gives 4 beats per second with the previous one.The frequency of the last fork is three times that of the first.The frequency of the fork is

A. 52 Hz

B. 56 Hz

C. 60 Hz

D. 110 Hz

Answer: B

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82. When source of sound moves towards a stationary observer, the wavelength of sound received by him

A. decrease while frequency increase

B. remain the same whereas frequency increase

C. increase and frequency also increase

D. decrease while frequency remains the same

Answer: D

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83. 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

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84. When the observer moves towards the stationary source with velocity, v_1, the apparent frequency of emitted note is f_1. When the observer moves away from the source with velocity v_1, the apparent frequency is f_2. If v is the velocity of sound in air and $\frac{f_1}{f_2} = 2$,then $\frac{v}{v_1} = ?$

A. 2

B. 3

C. 4

D. 5

Answer: A

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85. The observer is moving with velocity $'v'_0$ towards the stationary source of sound and then after crossing moves away from the source with velocity $'v'_0$. Assume that the medium through which the sound waves travel is at rest. If v is the velocity of sound and n is the frequency emitted by the source, then the difference between appearent frequencies heard by the observer is

A. $\frac{2nv_0}{v}$

B. $\frac{nv_0}{v}$

C. $\frac{v}{2nv_0}$

D. $\frac{V}{nv_0}$

Answer: A::B

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86. 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

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87. 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

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

A. 0.06

B. 0.12

C. 0.18

D. 0.24

Answer: A

Watch Video Solution

89. The Pitch of the whistle of an engine appears to drop to $\frac{5}{6}$ th of original value when it passes a stationary observer if the speed of sound in air is 350 m/s then the speed of engine is

A. 35 m/s

B. 70 m/s

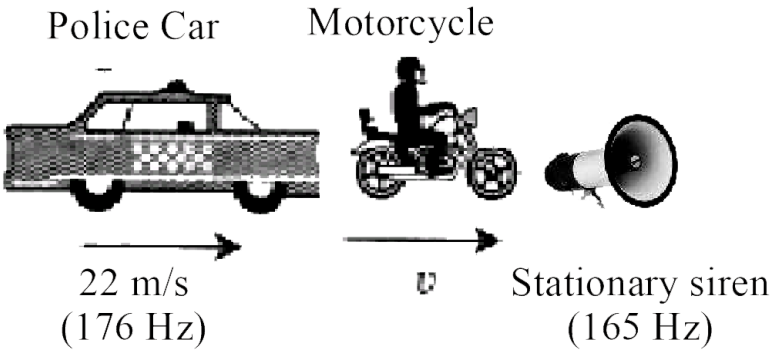
C. 105 m/s

D. 140 m/s

Answer: B

Watch Video Solution

90. 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

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

A. 109 vib/s

B. 132 vib/s

C. 140 vib/s

D. 248 vib/s

Answer: B

Watch Video Solution

92. A train is moving with a uniform speed of 33 m/s and an observer is aproaching the train with the same speed.If the train blows a whistle of frequency 1000 Hz and the velocity of sound is 333 m/s then the apparent of sound is 333m/s then the apparent frequency of the sound the observer hears is

A. 1220 Hz

B. 1099 Hz

C. 1110 Hz

D. 1200 Hz

Answer: C

View Text Solution

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

A. 350 Hz

B. 361 Hz

C. 411 Hz

D. 448 Hz

Answer: A

Watch Video Solution

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

A. 838 Hz

B. 885 Hz

C. 765 Hz

D. 800 Hz

Answer: D

Watch Video Solution

95. A car with a horn of frequency 620 Hz travels towards a large wall with a speed of $20ms^{-1}$ velocity of sound is $330ms^{-1}$ The frequency of echo of sound of horn as heard by the driver is

A. 700 Hz

B. 660 Hz

C. 620 Hz

D. 550 Hz

Answer: A

Watch Video Solution

96. A police car with a siren of frequency $8KHz$ is moving with uniform velocity $36Km/hr$ towards a ball building which

reflects the sound waves. The speed of sound in air is $320m/s$. The frequency of the siren heard by the car driver is

A. 8.50 kHz

B. 8.25 kHz

C. 7.75 kHz

D. 7.50kHz

Answer: A

Watch Video Solution

97. 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. $0.8,\ f, 0.8\lambda$

D. $1.2f, 1.2\lambda$

Answer: A

Watch Video Solution

98. A source of sound is moving with a velocity of $50ms^{-1}$ towards a stationary observer.The observer measures the frequency of sound as 500 Hz.The apparent frequency of sound as heard by the observer when source is moving away from him

with the same speed is (Speed of sound at room temperature 350 ms^{-1}

A. 400 Hz

B. 666 Hz

C. 375 Hz

D. 177.5 Hz

Answer: A

Watch Video Solution

99. A railway engine whistling at a constant frequency moves with a constant speed. It goes past a stationary observer standing beside the railway track. The frequency (n) of the

sound heard by the observer is plotted agains time (t). Which of the following best represents the resulting curve?

A. ` (##TRG_PHY_MCQ_XII_C07_E03_058_O01.png" width="30%">

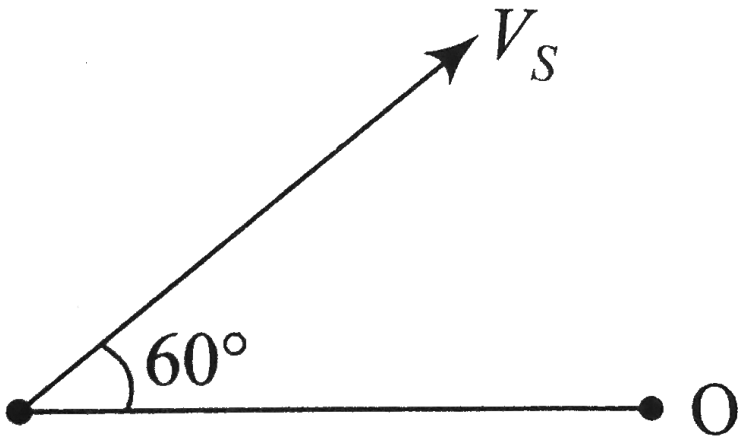
B. 

C. 

D. 

Answer: C

Watch Video Solution



100.

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

A. 97 Hz

B. 100 Hz

C. 103 Hz

D. 106 Hz

Answer: D

Watch Video Solution

101. A sound wave of frequency 'v' Hz initially travels a distance of 1 km in air.Then it gets reflected into a water reseroir of depth 600 m. The frequency of the wave at the bottom of the reervoir is $\left(v_{air} = 340\frac{m}{s}, v_{water} = 148\frac{m}{s}\right)$

A. $> vHz$

B. $< vHz$

C. vHz

D. 0

Answer: C

Watch Video Solution

102. 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. $\sqrt{2}A\cos\theta$

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

D. $\sqrt{2}A\dfrac{\cos(\theta)}{2}$

Answer: C

Watch Video Solution

103. A traverse wave is repersented by the equation

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

For what value of λ the maximumn particle velocity equal to two times the wave velocity

A. $\lambda = 2\pi y_0$

B. $\lambda = \frac{2\pi y_0}{3}$

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

D. $\lambda = \pi y_0$

Answer: C

Watch Video Solution

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

harmonic of the source of unknown frequency gives five beats per second, when sounded with a source of frequency 513 The unknown frequency is

A. 254 Hz

B. 246 Hz

C. 240 Hz

D. 260 Hz

Answer: D

Watch Video Solution

105. 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. 144 m/s

B. 256 m/s

C. 384 m/s

D. 720 m/s

Answer: A

Watch Video Solution

106. 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: C

Watch Video Solution

107. Two trains A and B are approaching a platfrom from opposite directions .The siren in the station is making a sound at a frequency 4kHz.The passengers in trains A and B hear siren at frequencies 4.5 and 5kHz respectively.Then the velocities of the trains A and B are (velocity of sound in air =340 m/s)

A. 42.5 m/s ,85m/s

B. 75 m/s, 55 m/s

C. 85 m/s, 8.5 m/s

D. 42.5 m/s ,62.m/s

Answer: B

Watch Video Solution

108. A student holds a tuning fork oscillating at 170 Hz. He walks towards a wall at a constant speed of 2 ms^{-1} The beat fequency observed by the student between the tuning fork and its echo is (Velocity of sound =342 ms^{-1})

A. 2.5 Hz

B. 3 Hz

C. 1 Hz

D. 2 Hz

Answer: A

Watch Video Solution

109. Equation of a simple harmonic progressive wave is $y = 0.03 \sin 8\pi \left(\frac{t}{0.016} - \frac{x}{1.6} \right)$,where all the quantities are in S.I.units The velocity of wave is

A. 0.010 m/s

B. 1.0 m/s

C. 10 m/s

D. 100 m/s

Answer: D

Watch Video Solution

110. 11 tuning forks are arranged in increasing order of frequency.Each gives 8 beat/s with previous one.If 11^{th} fork is octave of 1^{st} fork then the frequency of 10^{th} fork is

A. 96 Hz

B. 80 Hz

C. 152 Hz

D. 64 Hz

Answer: D

Watch Video Solution

111. What is time interval between two successive beats, if two waves are moving with frequencies,$n_1 = 320$ Hz and $n_2 = 325$ Hz ?

A. 0.1 s

B. 0.2 s

C. 0.3 s

D. 0.4 s

Answer: C

Watch Video Solution

112. Two waves of wavelengths 52.5 cm and 52 cm produces 5 beats per second.their frequencies are

A. 490Hz,495 Hz

B. 500 Hz ,505 Hz

C. 525 Hz,520 Hz

D. 500 Hz, 495 Hz

Answer: B

Watch Video Solution

113. Turning fork A of frequency 305 Hz produces 5 beats s^{-1} with another turing fork B. After filling tuning fork B, it produces 3 beats s^{-1} with A. The frequency of B before filling was

A. 300 Hz

B. 310 Hz

C. 302 Hz

D. 308 Hz

Answer: C

Watch Video Solution

114. When a tuning fork A and B are sounded together,the number of beats heard are 4 per second.When tuning fork A is field,the number of beats heard per second with B is changed to 3.If the frequency of tuning fork B is 384 Hz,the original frequency of A is

A. 388 Hz

B. 387 Hz

C. 381 Hz

D. 380 Hz

Answer: B

Watch Video Solution

115. The phase difference between two particles in a medium separated by a distance x is $\pi/6$ .If the frequency of the oscillation is 50 Hz and the velocity of propagation of the wave is 100 m/s then x =

A. 1/3 m

B. 1/4 m

C. 1/6 m

D. 1/12 m

Answer: D

Watch Video Solution

116. If the maximum particle velocity is 4 times of the wave velocity then relation between wavelength and amplitude is

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

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

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

D. $\lambda = \frac{\pi A}{3}$

Answer: C

Watch Video Solution

117. If $y_1 = a\sin(200\pi t)$ and $y_2 = a\sin(2008\pi t)$. then number of beats produced per second are

A. 2

B. 3

C. 4

D. 5

Answer: C

Watch Video Solution

118. A simple harmonic progressive wave is represented by $y = A\sin(100\pi t + 3x)$.The distance between two points on the wave at a phase difference of $\frac{\pi}{3}$ radian is

A. $\frac{\pi}{18}m$

B. $\frac{\pi}{9}m$

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

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

Answer: C

Watch Video Solution

119. A wave travelling along the x-axis is described by the equation $v(x,t) = 0.005\cos(\alpha x - \beta t)$. If the wavelength and the time period of the wave are $0.08m$ and $2.0s$, respectively, then α and β in appropriate units are

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

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

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

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

Answer: B

Watch Video Solution

120. The transvers displacement of a string (clamped at its both ends) is given by

$$y(x,t) = 0.06\sin\left(\frac{2\pi}{3}s\right)\cos(120\pi t)$$

Where x and y are in m and t in s. The length of the string $1.5m$ and its mass is $3.0 \times 10^{-2}kg$.

Answer the following :

(a) Does the funcation represent a travelling wave or a stational wave ?

(b) Interpret the wave as a superposition of two waves travelling in opposite directions. What is the wavelength. Frequency and speed of each wave ?

Datermine the tension in the string.

A. 2m, 120 Hz

B. $\frac{2}{3}m$, $60Hz$

C. $\frac{3}{2}m$. $120Hz$

D. $3m, 60Hz$

Answer: D

Watch Video Solution

121. 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: D

Watch Video Solution

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

A. 49 m

B. 98 m

C. 147 m

D. 196 m

Answer: C

Watch Video Solution

123. Two sources A and B are sounding notes of frequency 680 Hz. A listener moves from A to B with a constant velocity u. If the speed of sound is 340 m/s, What must be the value of u so that he hears 10 beats per second?

A. $2.0ms^{-1}$

B. $2.5ms^{-1}$

C. $3.0ms^{-1}$

D. $3.5ms^{-1}$

Answer: B

Watch Video Solution

124. A person speaking normally produces a sound intensity of $40dB$ at a distance of $1m$. If the threshold intensity for reasonable audibility is $20dB$, the maximum distance at which he can be heard cleary is.

A. 4m

B. 5 m

C. 10 m

D. 20 m

Answer: B

Watch Video Solution

125. Assertion: In a sinusoidal travelling wave on a string ,potential energy of deformation of string element at exterme position is maximum

Reason: The particles in sinusoidal travelling wave perform SHM

A. Assertion is true,Reason is true, Reason is a correct explanation for Assertion

B. Assertion is True Reason is True : Reason is not a correct explanation for Assertion

C. Assertion is True ,Reason is False

D. Assertion is False but , Reason is True

Answer: C

Watch Video Solution

126. As a wave propagates,Which of the following is a wrong option?

A. the wave intensity remains constant for a plane wave

B. the wave intensity decrease as the inverse of the distance from the source for a spherical waves

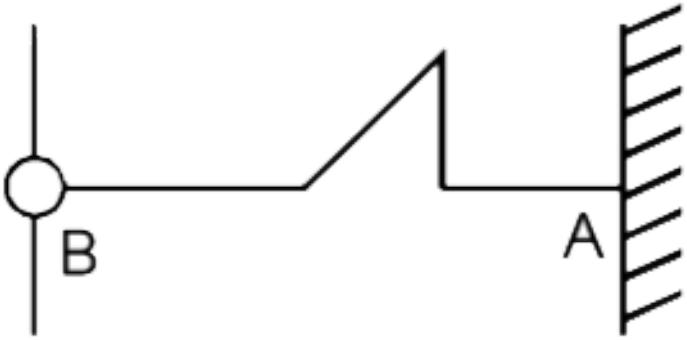
C. the wave intensity decreases as the inverse square of the distance from the source for a spherical wave.

D. total intensity of the spherical wave over the spherical surface remians constant at all times,while source is at the centre of spherical surface.

Answer: D

 Watch Video Solution

127. A pulse shown here is reflected from the rigid wall A and then from free end B. The shape of the string after these 2 Reflection will be.



A. ` (##TRG_PHY_MCQ_XII_C07_E04_002_O01.png" width="30%">

B. 

C. 

D. 

Answer: B

Watch Video Solution

128. A string consists of two parts attached at x=0 , The right part of the string $(x < 0)$ has mass per unit length μ_r and the left part of the string $(x < 0)$ has mass per unit length μ_l The tension in the string is T. If a wave of units amplitude travels along the left part of the string,what is the amplitude of the wave that is transmitted to the right part of the string?

A. 1

B. $\frac{2}{1+\sqrt{\mu_l/\mu_y}}$

C. $\frac{2}{1+\sqrt{\mu_l/\mu_y}}$

D. $\frac{\sqrt{\mu_l/\mu_y}-1}{\sqrt{\mu_l/\mu_y}+1}$

Answer: A

Watch Video Solution

129. Assertion: If two waves of same amplitude produce a resultant wave of same amplitude,then the phase difference between them will be 120°

Reason: The resultant amplitude of two waves is equal to vector sum of amplitudes treated as vectors

A. Assertion is True ,Reason is True , Reason is a correct explanation for Assertion

B. Assertion is True Reason is True : Reason is not a correct explanation for Assertion

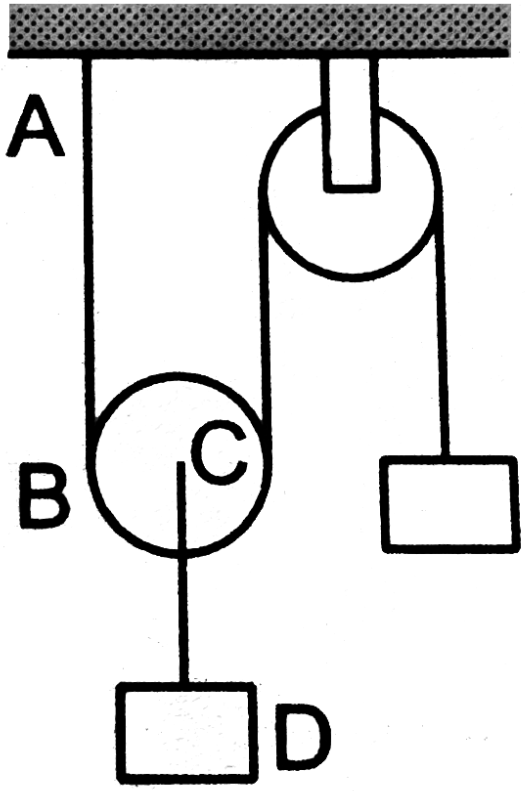
C. Assertion is True ,Reason is False

D. Assertion is False but , Reason is True

Answer: C

Watch Video Solution

130. Both strings shown in figure, are made of same material and have same cross section. The pulleys are light. The wave speed of a transverse wave in the string AB is v_1 and in CD it is v_2. Then $\frac{v_1}{v_2}$ is



A. 1

B. 2

C. $\sqrt{2}$

D. $\frac{1}{\sqrt{2}}$

Answer: A

Watch Video Solution

131. A transverse wave of equation

$y = 2\sin(0.01x + 30t)$moves on a stretched string from one end to another end.In the equation of wave.x and y are in cm and t in second.The time taken by wave to reach from one to another of string of length 45 cm is

A. $10\mu s$

B. $100\mu s$

C. $15ms$

D. $16ms$

Answer:

Watch Video Solution

132. A transverse wave is derscried by the equation $y = y_0 \sin 2\pi\left(ft - \frac{x}{\lambda}\right)$. 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: C

Watch Video Solution

133. A pulse travelling at a speed of $2\frac{m}{s}$ along the positive Z-axis is given by y $= \frac{3}{z^2+1}$ at t= 0 .The wave function representing the pulse at any times is given by

A. $y = \frac{3}{(z-2t)^2+1}$

B. $y = \frac{3}{(z+2t)^2+1}$

C. $y = \frac{3}{(2z+t)^2+1}$

D. $y = \frac{3}{(2z-t)^2+1}$

Answer: A

Watch Video Solution

134. A Uniform rope having mass m hags vertically from a rigid support. A transverse wave pulse is produced at the lower end. The speed v of wave pulse varies with height h from the lower end as

A. ` (##TRG_PHY_MCQ_XII_C07_E04_009_O01.png" width="30%">

B. 

C. 

D. 

Answer: A

Watch Video Solution

135. A composite string is made up of two uniform strings having mass per units length μ and 4μ The string is under uniform surface tension.A transverse wave pulse $y = 6\sin(5t + 40X)$ where y in mm, x is metres and t is in seconds,is sent through the lighter string towards joints,which is at x=0

The equation of transmitted pulse is,

A. $(4mm)\sin(5t - 40x)$

B. $(2mm)\sin(40x - 5t)$

C. $(4mm)\sin(5t + 40x)$

D. $(2mm)\sin(5t - 40x)$

Answer: D

Watch Video Solution

136. A rope of mass M and length L is being rotated about one end in a gravity free space A pulse is being created at one of the ends.The angle through which rope will be rotated in the time when pulse reaches the opposite end of rope for first time end for the angular velocity of rope ω is

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

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

C. $\frac{\pi}{2\sqrt{2}}$

D. $\pi 2$

Answer: C

Watch Video Solution

137. A transverse pulse is given as $y = \frac{10}{10x - \pi t}$ where x and y are in cm and in second

Assertion: The frequency of the pulse is $\frac{1}{20} Hz$

Reason: We can write this equation as $y = \frac{A}{kx - \omega t}$ where A .K. and ω are the amplitude,wave number and angular frequency of pulse

A. Assertion is true,Reason is true, Reason is a correct explanation for Assertion

B. Assertion is True Reason is True : Reason is not a correct explanation for Assertion

C. Assertion is True ,Reason is False

D. Assertion is False but , Reason is True

Answer: A

Watch Video Solution

138. Assertion : A progressive wave can be represented by $y = \log(x + vt)$

Reason: Any progressive wave must have the form $y = f(x - vt)$ or $y = f(x + vt)$ where symbols have their usual meaning

A. Assertion is True Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True Reason is True : Reason is not a correct explanation for Assertion

C. Assertion is True ,Reason is False

D. Assertion is False but , Reason is True

Answer: D

Watch Video Solution

139. The equation of a transverse wave is given by $\psi = 10^{-2} \sin \pi [30t - x\sqrt{3} - y]$ where x,y and ψ are in metre and t in second If phase difference between two points $A(2\sqrt{3}m, 2m)$ and $B(3\sqrt{3}m, 3m)$ $ben\pi$ .Find the value of n.

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

140. Stationary sound 'S' of frequency 334 Hz and a stationary observer 'O' are placed near a reflecting surface moving away from the source with velocity 2 m/s the apparent frequency of the echo of S considering velocity of sound equal to 334 m/s is

` (##TRG_PHY_MCQ_XII_C07_E04_015_Q01.png" width="80%">

A. 332 Hz

B. 326 Hz

C. 334 Hz

D. 330 Hz

Answer: C

Watch Video Solution

141. Two trains A and B moving with speeds $20m/s$ and $30m/s$ respectively in the same direction on the same straight track, with B ahead of A. The engines are at the front ends. The engine of train A blows a long whistle.

Assume that the sound of the whistle is composed of components varying in frequency from $f_1 = 800Hz$ to $f_2 = 1120Hz$, as shown in the figure. The spread in the frequency (highest frequency - lowest frequency) is thus $320Hz$. The speed of sound in still air is $340m/s$.

(4) The speed of sound of the whistle is

A. ` (##TRG_PHY_MCQ_XII_C07_E04_016_O01.png" width="30%">

B. 

C. 

D. 

Answer: A

Watch Video Solution

142. Three tuning forks of frequencies 248 Hz, 250 Hz, 252 Hz, are sounded together.The beat frequency is,

A. 2 Hz

B. 4 Hz

C. 6 Hz

D. 8 Hz

Answer: C

Watch Video Solution

143. Assertion : Our ears cannot distinguish two notes,one produced by a violin and other by a sitar, if they have exactly the same intensity and same frequency

Reason:When a musical instrument is played it produces a fundamental note which is accompanied by number of overtones called harmonics

A. Assertion is true,Reason is true, Reason is a correct explanation for Assertion

B. Assertion is True Reason is True : Reason is not a correct explanation for Assertion

C. Assertion is True ,Reason is False

D. Assertion is False but , Reason is True

Answer: D

Watch Video Solution

144. A source emitting sound of frequency f_0 is moving in a circle of radius R, having centre at the origin with a uniform speed =c/3 where c is the speed of sound.Find the maximum and minimum frequencies heard by stationary listener at the point (R/2,0)

A. $\frac{6f_0}{5}, \frac{6f_0}{7}$

B. $f_o\left(\frac{2\sqrt{3}}{2\sqrt{3}-1}\right), \left(\frac{f_o\left(2\sqrt{3}\right)}{2\sqrt{3}+1}\right)$

C. $\frac{3f_o}{2}, \frac{3f_o}{5}$

D. $\frac{4f_o}{3}, \frac{4f_o}{5}$

Answer: D

View Text Solution

145. String-1 is connected with string-2 The mass per unit length in string-1 is μ_1 and mass per unit length in string-2 is $4\mu_1$. The tension in the strings is T .A travelling wave is coming from the left .What fraction of the energy in the incident wave goes into string-2?

A. $\frac{1}{8}$

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

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

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

Answer: A

Watch Video Solution

146. When beats are produced by two progressive waves of nearly the same frequency, which one of the following if correct?

A. Amplitude of vibrations at any point changes simple harmonically with a frequency equal to the difference in frequency of two waves.

B. Particles vibrate harmonically with frequency equal to difference in component frequencies

C. Frequency of beats depends on the position where observer is.

D. Frequency of beats changes as time progresses.

Answer: D

 Watch Video Solution

147. The figure (i) shows the graphical representation of the air molecules in a tube of air (length =L) at atmosphric pressure on the absolute pressure P(x) graph.which of following picture corresponds to absolute pressure P(x) of figure (ii)?

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A. ` (##TRG_PHY_MCQ_XII_C07_E04_022_O01.png" width="30%">

B. 

C. 

D. 

Answer: A

View Text Solution

148. A sound increases its decibel reading from $20 \text{to} 40 dB$. This means that the intensity of the sound

A. doubled

B. 20 times greater

C. 1000 times greater

D. 100 times greater

Answer: B

Watch Video Solution

149. A car blowing a horn of frequency 350 Hz is moving normally towards a wall a speed of 5 m/s The beat frequency heard by a person standing between the car and wall is (speed of sound in air =350 m/s)

A. 0

B. 3.5 Hz

C. 5 Hz

D. 10 Hz

Answer: A

Watch Video Solution

Mcq 7 1

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

A. wavelength is 5 m.

B. frequency is 5Hz

C. velocity of propagation is 5m/s

D. wavelength is 0.2 m

Answer: B

Watch Video Solution

2. When a wave travels in a medium displacement of a particle is given by $y(x, t) = 0.03 \sin \pi(2t - 0.01x)$ where y and x are in metres and in seconds,The phase difference at a given instant of time between two paticles 25 m apart in the medium is

A. $\pi / 8$

B. $\pi / 4$

C. $\pi / 2$

D. π

Answer: B

Watch Video Solution

3. 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. the positive x-direction with velocity 4m/s and wavelength 0.1 m

B. the positive x-direction with velocity 4m/s and wavelength 0.4m

C. the negative x-direction with velocity 1m/s and wavelength 0.4m

D. the negative x-direction with velocity 4m/s and wavelength 0.1m

Answer: B

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

B. $y = 0.5\cos(\pi t - 2\pi x)$

C. $y = 0.5\sin(4\pi t + 2\pi x)$

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

Answer: C

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5. The equation of a wave is

$$y = 4\sin\left[\frac{\pi}{2}\left(2t + \frac{1}{8}x\right)\right]$$

where y and x are in centimeres and t is in seconds.

A. 4cm ,32cm ,16 cm/s , 0.5 Hz

B. $4cm,\ 16cm32cm\ /\ s1.0Hz$

C. 4 cm ,32 cm ,19 cm/s , 0.6 Hz

D. 4 cm , 24 cm , 16 cm/s , 1.0 Hz

Answer: A

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6. The equation of a wave is y =4 $\sin\left\{\frac{\pi}{2}\left(2t+\frac{x}{8}\right)\right\}$,where y,x are in cm and time is in second .The phase difference between two positions of the same particles which are occupied at time interval of 0.4 s is

A. 0.2π

B. 0.4π

C. 0.6π

D. 0.8π

Answer: B

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7. The equation of a wave of amplitude 0.02 m and period 0.04 s travelling along a stretched string with a velocity of 25m/s will

be

A. $y = 0.02 \sin 2\pi(0.04t - 0.5x)$

B. $y = 0.02 \sin 2\pi(25t - 2x)$

C. $y = 0.02 \sin 2\pi(0.04t - x)$

D. $y = 0.02 \sin 2\pi(25t - x)$

Answer: D

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8. The path difference between the two waves

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

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

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9. 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. $121cm/s$

Answer: A

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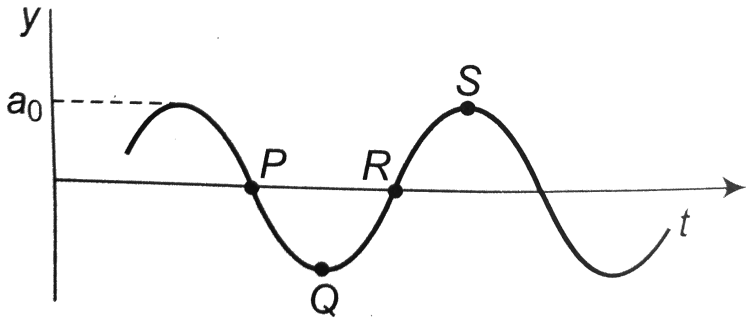
10.



A wave motion has the function $y = a_0 \sin(\omega t - kx)$. The graph in figure shows how the displacement y at a fixed point varies with time t. Which one of the labelled points Shows a displacement equal to that at the position $x = \frac{\pi}{2k}$ at time $t = 0$?

A. P

B. Q

C. R

D. S

Answer: B

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11. The eqyation of wave is $x = 5\sin\left(\frac{t}{0.4} - \frac{x}{4}\right)cm$ the maximum velocity of the particles of the medium is

A. $1m/s$

B. $1.5m/s$

C. $1.25m/s$

D. $2m/s$

Answer: A

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12. The equation of sound wave travelling along negative X-direction is given by, $y = 0.04 \sin \pi(500t + 1.5x)m$. The shortest distance between two particles having phase difference of π at the same instant is

A. 0.66 m

B. 0.5 m

C. 0.33 m

D. 0.2 m

Answer: A

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13. A progressive wave is represented by the equation $y = 0.5\sin(314t - 12.56x)$ where y and x are in metre and t is in second .Its wavelength is

A. 0.5 m

B. 0.2 m

C. 1 m

D. 2m

Answer: A

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14. A wave of frequency 400 Hz has a phase velocity of 300 m/s The phase difference between two displacement at a certain

point at time t= 10^{-3}s is

A. 72°

B. 102°

C. 144°

D. 180°

Answer: C

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15. A prograssive wave of frequency 500 Hz is travelling with a speed of 350 m/s A compressional maximum appears at a given instant,The minimum time interval after which a given instant,The minimum time interval after which a rarefactional maximum occurs at the same points is

A. $1/250s$

B. $1/500s$

C. $1/1000s$

D. $1/350s$

Answer: C

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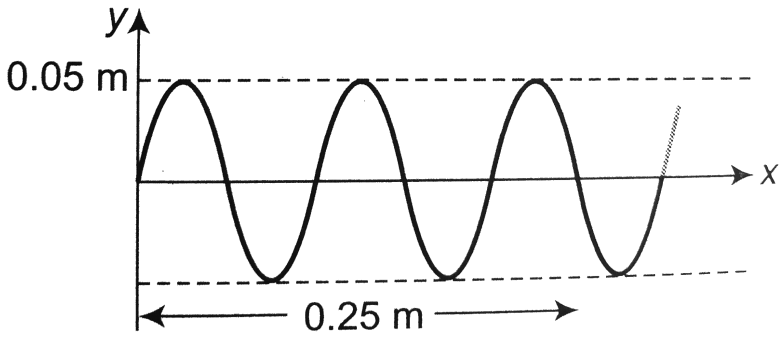

16.

If the speed of the wave shown in the figure is $330m/s$ in the

given medium then the equation of the wave propagating in the positive x-direction will be (all quantities are in M.K.S units)

A. $y = 0.05 \sin 2\pi(4000t - 12.5x)$

B. $y = 0.05 \sin 2\pi(4000t - 122.5x)$

C. $y = 0.05 \sin 2\pi(3300t - 10x)$

D. $y = 0.05 \sin 2\pi(3300x - 10t)$

Answer: C

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17. The equation of a wave is $y = A \sin(2\pi nt)$When it is reflected at a free end its amplitude becomes 90% The equation of the reflected wave is

A. $y = 0.9A \sin(2\pi nt + \pi)$

B. $y = \frac{A}{9}\sin(2\pi nt)$

C. $y = 0.9A\sin(2\pi nt)$

D. $y = 9A\sin(2\pi nt)$

Answer: C

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18. A bat flying above lake emits ultrasonic sound of 100 kHz ,When this wave falls on the water surface, it is partly reflected and partly transmitted .The wavelengths of the reflected and the transmitted waves are (The speed of sound in air is 340 m/s and in water is 1450 m/s)

A. 6.8 mm and 2.9 mm

B. 3.4 mm and 1.45 cm

C. 3.4 mm and 7.8 mm

D. 6.8mm and 1.45 cm

Answer: B

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19. 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

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20. Two waves represented by the following equations are travelling in the same $y_1 = 5\sin 2\pi(75t - 0.25x) y_2 10\sin 2\pi(150t - 0.50x).$ 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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21. 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. $2A^2$

D. $4A^2$

Answer: D

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22. Waves from two different sources overlap near a particular point. The amplitude and the frequency of the two waves are

the same.The ratio of the intensity,when the two waves arrives in the phase to that when they arrive 90° out of phase is

A. $1:1$

B. $\sqrt{2}:1$

C. $2:1$

D. $4:1$

Answer: C

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23. Consider ten identical sources of sound. All giving the same frequency but having phase angles which are random.If the average intensity of each source is I_0 the average of resultant intensity I due to all these ten sources will be

A. $I = 100I_0$

B. $I = 10I_0$

C. $I = I_0$

D. $I = \sqrt{10}I_0$

Answer: B

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24. Equations of two progressive waves at a certain point in a medium are given by, $y_1 = a_1 \sin(\omega t + \phi_1)$ and $y_1 = a_2 \sin(\omega t + \phi_2)$ If amplitude and time period of resultant wave formed by the superposition of these two waves is same as that of both the waves,then $\phi_1 - \phi_2$ is

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

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

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

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

Answer: B

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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

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26. If two waves $x_1 = A\sin(\omega t - 0.1x)$ and $x_2 A\sin(\omega t - 0.1x - \phi/2)$ are combined with each other ,then resultant amplitude of the combined waves is

A. $2A\frac{\cos(\phi)}{4}$

B. $A\sqrt{2\frac{\cos(\phi)}{2}}$

C. $2A\frac{\cos(\phi)}{2}$

D. $A\sqrt{\left(1+\frac{\cos(\phi)}{4}\right)}$

Answer: A

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27. The equations of two sound waves are given by, $y_1 = 3\sin(100\pi t)$ and $y_2 = 4\sin(150\pi t)$, The ratio of intensites of sound produced in the medium is

A. $1:4$

B. $2:3$

C. $3:4$

D. $9:16$

Answer: A

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28. Two waves of same frequency have amplitudes 5 cm and 3 cm, These waves are made to superpose in the same direction. The ratio of maximum intensity to minimum intensity at various places will be

A. $3:5$

B. $9:25$

C. $9:4$

D. $16:1$

Answer: D

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29. If two interfering waves have intensities in the ratio 9: 1 ,then the ratio of maximum to minimum amplitude is

A. $10:8$

B. $4:2$

C. $100:64$

D. $16:4$

Answer: B

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30. The number of beats produced per second by two tuning forks when sounded together is 4, If one of them has a frequency of 250 Hz,the frequency of other cannot be more than

A. 246 Hz

B. 248 Hz

C. 252 Hz

D. 254 Hz

Answer: D

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31. 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. $\frac{1}{2}s$

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

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

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

Answer: A

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32. A set of 56 tuning forks is arranged in series of increasing frequencies.If each fork gives 4 beats with preceding one and the frequency of the last in twice that of first ,then frequency of the first fork is

A. $220Hz$

B. $110Hz$

C. $224Hz$

D. $448Hz$

Answer: C

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33. Each of a given set of 32 tunning forks arranged in a series of increasing frequency, gives 6 beats per second with the preceding forks and the last fork is an octave of the first.The frequecy of the lowest pitch is

A. $180Hz$

B. $174Hz$

C. $186Hz$

D. $192Hz$

Answer: A

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34. Two vibrating tuning forks produce prograssive waves given by $y_1 = 4\sin 500\pi t,$ and $y_2 = 2\sin 506\pi t$ and are hold near the ear of a person Number of beats head per minute is

A. 180

B. 3

C. 360

D. 60

Answer: C

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35. Two waves of wavelength 2 m and 2.02 m , with the same speed, superimpose to produce 2 beats per second ,The speed of each wave is

A. $400ms^{-1}$

B. $404ms^{-1}$

C. $402ms^{-1}$

D. $406ms^{-1}$

Answer: A

Watch Video Solution

36. Two turning forks produce 4 beats per second when sounded together,The frequency of one of them is 200 Hz.When the other tunning fork is loaded with a little wax. The beats stop.The frequency of second funinf fork is

A. $200Hz$

B. 204 Hz

C. 196 Hz

D. 208 Hz

Answer: B

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37. The velocity of sound in a gas ,in which two waves of length 1.00 m and 1.01 m produce 10 beats in 3 second is

A. 336. 67 m/s

B. 326.67 m/s

C. 346.67m/s

D. 356.67m/s

Answer: B

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38. A set of 28 tuning forks is arranged in a series of decreasing frequencies.Each fork girves 4 beats per second with the preceding one and the frequencies of the first forks is an octave of the last.The frequency of the first fork in Hz is

A. 220

B. 216

C. 212

D. 208

Answer: A

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39. Wavelengths of two sound waves in air are $\frac{110}{177}m$ and $\frac{110}{175}$ m respectively.When they are sounded together,they produce 6 beats per second.The frequency of the two waves respectively will be

A. ` 531, Hz ,525 Hz

B. 525 Hz ,519 Hz

C. 537 HZ , 531 Hz

D. 519 Hz ,513 Hz

Answer: B

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40. A person is standing on a railway platform.An engine blowing a whistle of frequency 640 Hz approaches him with a

speed of 72 km /hr,The frequency of the note heard by the person is (velocity of sound is 340 m/s)

A. 650 Hz

B. 660 Hz

C. 675 Hz

D. 680 Hz

Answer: A

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41. Two aeroplanes A and B ,each moving with a speed of 720 km/hr. are moving directly away from each other.Aeroplane A emits a whistle of frequency 1080 Hz.The apparent frequency

heard by a person in plane B will be (velocity of sound in air =340 m/s)

A. 200 Hz

B. 260 Hz

C. 280 Hz

D. 300 Hz

Answer: D

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42. An engine blowing a whistle of frequency 133 Hz moves with a velocity of $60\frac{m}{s}$ towards a wall from which an echo is heard. Calculate the frequency of the echo heard by the driver. (velocity of sound in air in $340\frac{m}{s}$.)

A. 190 Hz

B. 161 Hz

C. 133 Hz

D. 113 Hz

Answer: C

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43. A passenger is sitting in a fast moving train The engine of the train below a whistle of frequency 'n' .If the apparent frequency of sound heard by the passenger is 'n' then

A. $n' < n$

B. $nt > n$

C. $n' = n$

D. $n' \geq n$

Answer: A

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44. A source of sound and a listener both are moving in the same direction,the source following the listener. If the respective velocities of sound ,source and listener are v, v_s and v_l / s then the ratio of the actual frequency of the source and the apparent frequency as received by the listener is

A. $\frac{v - v_l}{v - v_s}$

B. $\frac{v - v_s}{v - v_l}$

C. $\frac{v - v_l}{v + v_s}$

D. $\frac{v + v_s}{v + v_l}$

Answer: C

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45. If a stationary observer notes a change of 25% in the frequency of a while of an engine coming towards him then the velocity of the engine is)(velocity of sound =332 m/s)

A. 66.4 m/s

B. 64 m/s

C. 60 km/hr

D. 32 km /hr

Answer: B

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46. A train A is travelling at a speed of 108 km hr^{-1} The train approaches another train B standing on the platform.The engine of the train B below its horn. The frequency of the horn as observed by the driver in train A is 504 Hz. The frequency of the horn of train B is (speed of sound = 330 ms^{-1}

A. 504 Hz

B. 462 Hz

C. 550 Hz

D. 407 Hz

Answer: A

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47. Two cars are approaching each other with same speed of $20m/s$. A man in car A fires bullets at regular intervals of 10 seconds. What will be the time interval noted by a man in car B between 2 bullets?

(velocity of sound =340 m/s)

A. 11. 1s

B. 10s

C. 8.9 s

D. 12 s

Answer: B

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48. An engine is moving on a circular track with a constant speed It .is blowing a whistle of frequency 500 Hz.The frequency recived by an overser standing stationary at the centre of the track is

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A. 500 Hz

B. more than 500 Hz

C. less than 500 Hz

D. more or less than 500 Hz depending on the actual speed of the engine

Answer: C

View Text Solution

49. An engine driver moving towards a wall with a velocity of 60 m/s emits a note of 1400 Hz. Speed of sound in air is 340 m/s .The frequency of the note after reflection from the wall as heard by the engine driver is

A. 1600 Hz

B. 1200 Hz

C. 1000 Hz

D. 2000 Hz

Answer: A

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50. An object producing a pitch of 600 Hz approaches a stationary person in a straight line with a velocity of 200m/s

Veocity of sound is 300 m/s The person will note a change in frequency ,as the object flies past him, equal to

A. 1440 Hz

B. 240 HZ

C. 1200 Hz

D. 960 HZ

Answer: D

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51. When both source and listener approach each other with a velocity equal to half the velocity of sound,the change in frequency of the sound as detected by listener is

A. 3

B. 1

C. 1.5

D. 2

Answer: A

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52. 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. $1.5ms^{-1}$

B. $12ms^{-1}$

C. $6ms^{-1}$

D. $3ms^{-1}$

Answer: D

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53. A wave is expressed by the equation

$y = 0.5 \sin \pi(0.01x - 3t)$

where y and x are in metre and t in seconds. Find the speed of propagation.

A. 100 m/s

B. 150 m/s

C. 200 m/s

D. 300 m/s

Answer: D

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54. Two sources of sound A and B produce the wave of 350 Hz ,they vibrate in the same phase.The particle P is vibrating under the influence of these two wave.If the amplitudes at the point P Produced by the two waves is 0.3 mm and 0.4 mm ,then the resultant amplitude of the point P will be [Given AP -BP = 25 cm and the velocity of sound is 350 m/s]

A. 0.7 mm

B. 0.1mm

C. 0.2mm

D. 0.5mm

Answer: D

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55. A tuning fork whose frequency is given by the manufacturer as 512 Hz is being tested using an accurate oscillator.It is found that they produce 2 beats per second,when the oscillator reads 514 Hz and 6 beats per second,when it reads 510 Hz.The actual frequency of the fork is

A. 508 Hz

B. 512 Hz

C. 516 Hz

D. 518 Hz

Answer: D

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56. Two sounding bodies producing prograssive waves given by $y_1 = 4\sin(400\pi t)$ and $y_2 3\sin(404\pi t)$,are situated very near to the ears of a person.He will hear (Here intensity ratio is between maxima and minima)

A. 2 beats per second with intensity ratio 49/1

B. 4 beats per second with intensity ratio 49/1

C. 2 beats per second with intensity ratio 7/3

D. 4 beats per second with intensity ratio 4/3

Answer: C

Watch Video Solution

57. A source of sound emitting a note of frequency 90 Hz moves towards an observer with speed equal to $\left(\frac{1}{10}\right)^{th}$ of velocity of sound.The frequency of the note heard by the observer will be

A. 100 Hz

B. 82 Hz

C. 200 Hz

D. 90 Hz

Answer: A

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58. 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. 200 Hz

D. 180 Hz

Answer: A

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59. Assertion :on reflection from a rigid boundary (denser medium) there is a complete reversal of phase.

Reason : This is because o reflection at a denser medium. Both the particle velocity and wave velocity are reversed in sign.

A. Assertion is True ,Reason is True , Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True , Reason is not a correct explanation for Assertion

C. Assertion is True ,Reason is False

D. Assertion is False but , Reason is True

Answer: C

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60. A sonic source, located in a uniform medium, emits waves of frequency n. If intensity, energy density (energy per unit volume of the medium) and maximum speed of oscillations of medium particle are, respectively, I, E and u_0 at a point, then which of the following graphs are correct?

A. ` (##TRG_PHY_MCQ_XII_C07_E02_060_O01.png" width="30%">

B. 

C. 

D. 

Answer: A

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61. The well known example of longitudinal wave is

A. sound waves

B. light waves

C. wireless waves

D. water waves

Answer: C

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