PHYSICS

BOOKS - TARGET PHYSICS (HINGLISH)

STATIONARY WAVES

Classical Thinking

1. Mechanical waves require _____ medium for their propagation.

A. elastic

B. inelastic

C. rigid

D. liquid

Answer: A

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2. If stationary waves are being generated, then particles of melium

A. remain stationary.

B. do not execute oscillatory motion.

C. execute simple harmonic motion and at some places amplitude is maximum.

D. exectue simple harmonic motion of equal amplitude.

Answer: C

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3. When are stationary waves produced?

A. when two waves of equal frequency superpose while travelling in opposite directions.

B. due to diffraction.

C. due to superposition of two waves of equal frequency while travelling in the same direction.

D. due to constructive interference.

Answer: A

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4. When the stationary waves are formed, then

A. tranfer of energy is double of the energy of component waves.

B. transfer of energy is zero.

C. no energy is present in the medium.

D. value of energy density at each point of the path is infinite.

Answer: B

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5. In a stationary wave,

A. strain is maximum at antinodes.

B. strain is maximum at nodes.

C. strain is minimum at nodes.

D. amplitude is zero at all points.

Answer: B

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6. At nodes, the velocity of stationary wave is

A. zero.

B. maximum.

C. minimum but not zero.

D. depends on amplitude.

Answer: A

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7. In a stationary wave, at the antinods there is a change in

A. density.

B. pressure.

C. both pressure and density

D. neither pressure nor density.

Answer: D

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8. In a stationary wave, the particle velocity at the nodal points is

A. zero.

B. maximum and finite.

C. minimum but non zero.

D. infinite.

Answer: A

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9. Select the WRONG statement for a stationary wave.

A. The particles of the medium perform S.H.M. of same period.

B. Amplitude of oscillation for each particle is different.

C. There is no transport of energy.

D. The wave does not travel along positive or negative x-direction.

Answer: A

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10. Whan stationary waves are set up in a medium, which of the following is a true statement?

A. All the particles in the medium are in the same phase of vibration at all times.

B. There is a continuous phase lag along the wave.

C. There is a continuous phase lead along the wave.

D. The particles between two successive nodes are in same phase but the particle just oppsite to a node are in opposite phase.

Answer: D

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

A. simultaneously with equal velocity.

B. at different times but with equal velocity.

C. at different times with different velocities.

D. simultaneously but with different velocities.

Answer: D

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12. In any stationary wave, for vibrating particles,

A. the amplitudes are same but the time periods are different.

B. the amplitudes are different but the time periods are same.

C. the amplitudes and the time periods both are same.

D. the amplitudes and the time periods both are different.

Answer: B

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13. In a stationary wave, for the particles situated at either side of an antinode at a distance $\lambda/2$,

A. phases are same but the amplitudes are different.

B. phases are opposite and the amplitudes are same

C. both phases and the amplitudes are different.

D. both phases and the amplitudes are same.

Answer: D

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14. If the length of the vibrating string is kept constant, then frequency of the string will be directly proportional to

A. $\sqrt{T}$

B. T

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

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

Answer: A

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15. The harmonics produced in a vibrating string are

A. not related to each other.

B. of same frequency.

C. in the ratio $1:2:3$.

D. in the ratio $1:3:5$.

Answer: C

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16. In a stretched string.

A. only even harmonics are produced.

B. only odd harmonice are produced.

C. even as well as odd harmonics are produced.

D. neither even nor odd harmonics are produced.

Answer: C

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17. The string of a sonometer is plucked so as to make it vibrate in one sement. The sound produced is called

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18. $y = 6\sin\frac{\pi x}{6}\cos 8\pi t$ represents a stationary wave.

The frequency of the stationary wave in cycles/s is

A. 2

B. 4

C. 6

D. 8

Answer: B

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19. In an air column, stationary waves can be produced even if the superposing waves

A. have different quality.

B. have different pitch.

C. have different amplitude.

D. have different velocities.

Answer: C

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20. Stationary waves in closed pipe will produce

A. all the harmonics.

B. all the even harmonics.

C. all the odd harmonics.

D. no harmonics.

Answer: A

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21. Which of the pipes loses more energy?

A. Wider

B. Thinner

C. Both (A) and (B)

D. Thick walled pipe

Answer: A

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22. Pleasing sounds are produced

A. in opne organ pipe.

B. in closed organ pipe.

C. in both closed and open pipes.

D. in string instruments.

Answer: A

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23. The frequency of vibration of open orgen pipe is

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

B. $\frac{v}{2l + 1.2d}$

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

D. $\frac{v}{8l}$

Answer: B

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24. A pipe open at both ends gives frequencies which are

A. only even multiples of fundamental frequency.

B. only odd multiples of fundamental frequency.

C. all integral multiples of fundamental frequency.

D. all fractional multiple of fundamental frequency.

Answer: C

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25. 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. n, n^2, n^3,.....

Answer: A

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26. In case of closed organ pipe, which harmonin the p^{th} overtone will be

A. 2p+1

B. 2p-1

C. p+1

D. p-1

Answer: C

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

A. l/4 from ends.

B. the middle of pipe.

C. the ends of pipe.

D. l/8 from ends of pipe.

Answer: B

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

A. odd harmonics.

B. even harmonics.

C. enven as well as odd harmonics.

D. fractional harmonics.

Answer: A

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29. 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

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30. When a body oscillates with its natural frequency then its vibration is called

A. free vibration.

B. forced vibation.

C. resonance.

D. phenomenon of beats.

Answer: A

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31. Current oscillation in an LCR circuit is an example of

A. fundamental frequency.

B. natural frequency.

C. frequency of resonanace.

D. damped frequency.

Answer: B

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32. What happens to the natural frequency of virbation of stretched spring when its length and diameter are increased?

A. Frequency decreases

B. Frequency increases.

C. No change in frequency.

D. May increase of decrease.

Answer: A

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33. If a body is set into vibrations with a strong external force, the vibrations are

A. free vibrations.

B. resonant vibrations.

C. forced vibrations.

D. damped vibrations.

Answer: C

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34. The example forced vibration is

A. resonance.

B. beats.

C. interference.

D. diffraction.

Answer: B

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35. In forced vibration amplitude

A. changes continuously.

B. remains constant.

C. first decreases gradually and finally becomes zero.

D. changes irregularly.

Answer: B

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36. In forced vibration the body vibrates with

A. same frequency as that of external periodic force.

B. any frequency having value between natural and external periodic force.

C. natural frequency.

D. both (A) and (C)

Answer: A

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37. There is a large difference between the frequencies of external periodic force and natural frequency of a body. The body will

A. vibrate with large amplitude and frequency of force.

B. not vibrate.

C. vibrate with small amplitude with its own frequency.

D. vibrate with small amplitude and with frequency of force.

Answer: D

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38. Resonsance is a special case of

A. forced vibrations.

B. free vibrations.

C. natural vibrations.

D. damped vibrations.

Answer: A

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39. Resonance occurs when

A. a body vibrates at a frequency lower than its normal frequency.

B. a body vibrates at a frequency higher than its normal frequency.

C. a body is set into vibrations with its natural frequency by another body vibratin with the same frequency.

D. a body is made of the same meterial as the sound source.

Answer: C

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40. Above the resonant frequency,

A. the frequency of the body is less then the frequency of the external periodic force.

B. the frequency of the body is greater than the frequency of the external periodic force.

C. the frequency of the body is exactly equal to the frequency of the external periodic force.

D. both (A) and (B)

Answer: A

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41. In resonance,

A. the energy released by the vibrating body is maximum.

B. energy is absorbed by the vibrating body is maximum.

C. neither energy is absorbed by the vibrating body nor energy is released.

D. energy form does not evolve.

Answer: B

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42. A length of 30 cm of a steel wire on a guitar gives a note of 300 Hz when it is plucked. What length of this wire will give a note of 400 Hz, if the tension does not change?

A. 40 cm

B. 10 cm

C. 75 cm

D. 22.5 cm

Answer: D

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43. 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. inceases.

D. first increases then decreases.

Answer: C

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

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

B. n

C. 2n

D. 4n

Answer: C

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45. Assertion: The fundamental frequency of vibration of an open organ pipe remains same if the radius of the pipe is doubled.

Reason: Frequency of vibration of an open organ pipe is independent of the radius of pipe.

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

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Critical Thingking

1. Which of the following is the equation of stationary wave?

A. $y = 2a\cos\left(\frac{2\pi vt}{\lambda} + \phi\right)$

B. $y = 2a\sin\frac{2\pi}{\lambda}vt.\cos\frac{2\pi x}{\lambda}$

C. $y = a\sin\frac{2\pi}{\lambda}vt + \cos\frac{2\pi x}{\lambda}$

D. $y = a\sin\frac{\pi}{\lambda}t + \cos\frac{2\pi x}{\lambda}$

Answer: B

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2. 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. $y = a \sin \frac{2\pi}{\lambda} vt + \cos \frac{2\pi x}{\lambda}$

D. $y = a \sin \frac{\pi}{\lambda} t + \cos \frac{2\pi x}{\lambda}$

Answer: B

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3. A standing wave resulte from sum of two transverse travelling waves given by, $y_1 = 0.050\cos(\pi x - 4\pi t)$ and $y_2 = 0.050\cos(\pi x + 4\pi t)$, where x, y_1, y_2 are in metre and t in seconds. The smallest positive value of x that corresponds to a node is

A. 0 m

B. 0.5 m

C. 1.5 m

D. 1 m

Answer: B

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

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

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

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

Answer: D

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5. 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

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6. $y = 6 \sin \frac{\pi x}{6} \cos 8\pi t$ represents a stationary nodes is

A. 2

B. 3

C. 6

D. 12

Answer: C

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

A. Stationary waves.

B. Progressive waves.

C. Transverse waves.

D. Electromagnetic waves.

Answer: A

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8. 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/s in -x direction.

B. 32 cm/s in -x direction.

C. 32 cm/s in +x direction.

D. 64 cm/s in +x direction.

Answer: D

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9. A standing wave is represented by, $y - A\sin(100t)\cos(0.01x)$, where x,y and A are in millimeter and t in second. The velocity of the wave is

A. $10^4 m/s$

B. 10m/s

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

D. $10^3 m/s$

Answer: B

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10. 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

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11. 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 wouldf 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

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12. A string is producing transverse vibration whose equation is y = 0.021 sin (x + 30 t) , where x and y are in metre and t is in second . If the linear density of the string is $1.3 \times 10^{-4} kg/m$, then tension in string in newton will be

A. 10 N

B. 0.5 N

C. 1 N

D. 0.117 N

Answer: D

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13. A string fixed at both ends is 8 long and has a mass of 0.120 kg. It is subjected to a tension 96 N and set oscillating. The longest possible wavelwngth and frequency of the standing wave are

A. 16m, 5 Hz

B. 8m, 10Hz

C. 16 m, 10 Hz

D. 8 m, 5 Hz

Answer: A

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14. A wire having a linear mass density $5.0 \times 10^3 kg/m$ is stretched between two rigid supports with tension of 450 N. The wire resonates at a frequency of $420Hz$. The next higher frequency at which the same wire resonates is$480N$. The length of the wire is

A. 1.4 m

B. 2.1 m

C. 2.8 m

D. 3.5 m

Answer: B

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15. 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

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16. A stretched wire of lenth 110 cm is divided into three

segments whose frequencies are in ratio $1:2:3$. Their length must be

A. 20 cm , 30 cm , 60 cm

B. 60 cm, 30 cm, 20 cm

C. 60 cm, 20 cm, 30 cm

D. 30 cm, 60 cm, 20 cm

Answer: B

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17. 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

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18. 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

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19. A length of wire has frequency of 256 Hz when stretched by a force of 16 kg. By what factor must the force of be changed so that it emits a note of frequency 320 Hz ?

A. 25 kg-wt

B. 9 kg-wt

C. 3 kg-wt

D. 5 kg-wt

Answer: B

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20. In a stretched wire under tension and fixed at both ends, the area of cross section of the wire is halved and the tension is doubled. The frequency of the wire will be

A. n

B. 2n

C. 3n

D. $\sqrt{2}n$

Answer: B

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21. A string under a tension of $100N$, emitting its fundamental mode , gives $5beats\,/\,s$ with a tuning fork. When the tension is increased to $121N$, again $5beats\,/\,s$ are heard. The frequency of the fork is

A. 110 Hz

B. 125 Hz

C. 105 Hz

D. 200 Hz

Answer: C

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22. A sonometer wire with a suspended mass of M=1 kg is in resononce with a given tuning fork. The apparatus is taken to the moon where the acceleration due to gravity is $1/6^{th}$ that on earth. To obtain resonance on the moon, the value of M should be

A. 1 kg

B. $\sqrt{6}kg$

C. 6 kg

D. 36 kg

Answer: C

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23. A steel piano wire 0.5 m long has a total mass of 0.01 kg and is stretched with a tension of 800 N. The frequency, when it vibrates in its fundamental mode, is

A. 2 Hz

B. 4 Hz

C. 100 Hz

D. 200 Hz

Answer: D

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24. Two sitar strings A and B playing the note 'Ga' are slightly out of tune and produce beats of frequency 6 Hz. The tension in the string A is slightly reduced and the beat frequency is found to reduce to 3 Hz. If the original frequency of A is 324 Hz, what is the frequency of B?

A. 318 Hz

B. 321 Hz

C. 327 Hz

D. 330 Hz

Answer: A

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25. A tuning fork and a sonometer wire were sounded together and produced 4 beats per second when the length of sonometer wire is 95 cm or 100 cm. The frequency of the tuning fork is

A. 156 Hz

B. 152 Hz

C. 148 Hz

D. 160 Hz

Answer: A

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26. The frequency of the fundamental note produced by a closed organ pipe is n. If the diameter of the pipe is doubled, then the frequency of the fundamental note produced by it will be (Neglect end correction)

A. 4n

B. 2n

C. n

D. n/2

Answer: C

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27. 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. 74.1 cm

B. 72.7 cm

C. 75.4 cm

D. 73.1 cm

Answer: A

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28. 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. 50 HZ

B. 100 Hz

C. 150 Hz

D. 250 Hz

Answer: B

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

A. 100 Hz

B. 150 Hz

C. 200 Hz

D. 250 Hz

Answer: D

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30. 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

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31. A closed pipe has certain frequency. Now its length is halved. Considering the end correction, its frequency will now become

A. double.

B. more than double.

C. less than double.

D. data insufficient.

Answer: C

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32. 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

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33. Two closed - end pipes , when sounded together produce $5 beats / s$. If their lengths are in the ratio $100 : 101$, then fundamental notes (in Hz) produced by them are

A. 245, 250

B. 250, 255

C. 495, 500

D. 505, 500

Answer: D

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34. 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. 1 N

B. 4 N

C. 8 N

D. 16 N

Answer: A

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35. 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. 300 m/s

B. 200 m/s

C. 150 m/s

D. 75 m/s

Answer: B

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36. A sufficiently long closed organ pipe has a small hole at its bottom . Initially , the pipe is empty . Water is poured into the pipe at a constant rate . The fundamental frequency of the air column in the pipe

A. continously increases.

B. first increases and then becomes constant.

C. continuously decreases.

D. first decreases and then becomes constant.

Answer: B

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37. In a long cylindrical tube , the water level is adjusted and the air column above it is made to vibrate in unison with a vibrating tuning fork kept at the open end . Maximum sound is heard when the air column lengths are equal to

A. $\frac{\lambda}{4}, \frac{\lambda}{2}, \frac{3\lambda}{4}$

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

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

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

Answer: D

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38. In a resonance tube, the first resonance occurs at 16 cm and the second resonance occurs at 49 cm. The end corrections will be

A. 0.3 cm

B. 0.5 cm

C. 0.8 cm

D. 1.0 cm

Answer: B

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39. The end correction of a resonance colume is 1.0 cm. If the shortest length resonating with the tuning fork is

15.0 cm the next resonating length will be

A. 48 cm

B. 45 cm

C. 46 cm

D. 47 cm

Answer: D

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40. 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. 330 Hz

C. 250 Hz

D. 165 Hz

Answer: A

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41. 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

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42. The velocity of sound in air is $320ms^{-1}$. An open organ pipe 40 cm long resonates at a frequency of 1200 Hz. Which overtone is it ?

A. 1^{st}

B. 2^{nd}

C. 3^{rd}

D. 4^{th}

Answer: B

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43. Two similar open organ pipes of length 50 cm and 50.5 cm produce 3 beats per second when sounded together. The velocity of sound in air is

A. 303 m/s

B. 330 m/s

C. 151.5 m/s

D. 603 m/s

Answer: A

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44. 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

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45. 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

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46. For a certain organ pipe three successive resonance frequencies are observed at 425Hz, 595 Hz and 765Hz respectively. If the speed of sound air is 340m/s, then the length of the pipe is

A. closed pipe of length 1 m.

B. closed pipe of length 2 m

C. open pipe of length 1 m.

D. open pipe of length 2 m.

Answer: A

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

A. same as the fundamental frequncy 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 and opne tube of same length.

D. $\frac{4}{3}$ times that of the first overtone of open tube of same length.

Answer: D

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48. Assertion: An open organ pipe of certain length has the same fundamental frequency as closed organ pipe of half the length.

Reason : In case of an open organ organ pipe, at both the ends antinodes are formed while in case of closed organ pipe, at one end antinode and at the other end node is formed.

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: B

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

A. $4:1$

B. $2:1$

C. $3:1$

D. $2:3$

Answer: B

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50. An open organ pipe and a closed organ pipe are tuned to the same fundamental wavelength. What is the ratio of their lengths ?

A. $1:2$

B. $2:1$

C. $2:3$

D. $4:3$

Answer: A

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51. The third overtone of an open organ pipe of length l_0 has the same frequency as the third overtone of a closed pipe of length l_c. The ratio l_0 / l_c is equal to

A. $\frac{5}{8}$

B. $\frac{8}{5}$

C. $\frac{7}{8}$

D. $\frac{8}{7}$

Answer: D

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

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

B. 2n

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

D. 4n

Answer: A

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53. An open organ pipe has fundamental frequency 100 Hz. What frequency will be produced if its one end is closed ?

A. 100, 200, 300, 400 .....

B. 50, 150, 250, 350 .....

C. 75, 150, 225, 300 ....

D. 50, 100, 150, 200 .....

Answer: B

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54. An open organ pipe produces its fundamdental frequency f. When the pipe is dipped in water so that $\frac{2}{5}$ of its length is under water, then its fundamental frequency becomes

A. $\frac{12}{5}n$

B. $\frac{6}{5}n$

C. $\frac{5}{12}n$

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

Answer: D

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55. 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 ands 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

56. An air column, closed at one end and open at the other end, resonates with a tuning fork of frequency f when its length is $45cm, 99cm$ and at two other lengths in between these values. The wavelength of sound in the air column is

A. 180 cm

B. 108 cm

C. 54 cm

D. 36 cm

Answer: D

Watch Video Solution

57. An open pipe of certain length produces fundamental frequency 500 Hz. A closed pipe of some other length produces fundamental frequency 450 Hz. When the two are joined to form a longer close tube, its fundamental frequency will be

A. 169 Hz

B. 161 Hz

C. 179 Hz

D. 155 Hz

Answer: B

Watch Video Solution

58. In Melde's experiment, frequency of fork N and the length of the thread are kept constant. Then the relation between the number of loops p and the tension in the thread T is given by

A. pT =constant.

B. pT^2= constant.

C. Tp^2=constant.

D. p/T= constant.

Answer: C

Watch Video Solution

59. In Melde's experiment, if the length of the string and the tension are kept constant, then the number of loops in perpendicular position is

A. equal to the number o loops in parallel position.

B. half the number of loops in parallel position.

C. double the number of loops in parallel position.

D. three times the number of loops in parallel position.

Answer: C

Watch Video Solution

60. In Melde's experiment, a string of length 0.8 m and mass 1.0 g vibrates in 4 segments when the tension in the string is 0.4 kg-wt. The frequency of the fork is (in perpendicular position)

A. 70 Hz

B. 90 Hz

C. 140 Hz

D. 180 Hz

Answer: C

Watch Video Solution

61. If we add 8 kg load to the hanger of sonometer, the fundamental frequency becomes 3 times of its initial value. The initial load in the hanger was

A. 0.5 kg-wt

B. 1 kg-wt

C. 2 kg-wt

D. 4 kg-wt

Answer: B

 Watch Video Solution

62. 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. $\frac{(p_A + p_0)}{(p_A - p_0)}$

B. $\frac{(p_A + 2p_0)}{(p_A - 2p_0)}$

C. $\frac{p_A}{p_0}$

D. $\left(\frac{p_A + \frac{1}{2}p_0}{p_A - \frac{1}{2}p_0}\right)$

Answer: A

Watch Video Solution

Watch Video Solution

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

Reason: When a musical instrument is played, if produces a fundamental note which is accompanied by a 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

64. In Melde's experiment, 3 loops are obtained when the string is stretched by a mass of 6 gm. In order to get 2 loops without changing the position of the fork, the weight to be added (in gm) will be (g=10 m / s^2)

A. 8 g

B. 13.5 g

C. 7.0 g

D. 6.0 g

Answer: B

Watch Video Solution

65. A weight is attached to the free end of a sonometer wire. It gives resonance at length of 40 cm, when it is vibrating in unison with tuning fork of frequency 512 Hz. The weight is then immersed wholly in water, the resonating length is reduced to 30 cm. The relative density of the fluid in which weight is immersed is

A. $\frac{16}{9}$

B. $\frac{16}{7}$

C. $\frac{16}{5}$

D. $\frac{16}{3}$

Answer: B

Watch Video Solution

66. In a sonometer experiment the bridges are separted by a fixed distance the wire which is slightly elastic emits a tone of frequency n when held by tension T If the tension is increased to 4T the tone emitted by the wire will be of frequency

A. n

B. 3n

C. greater than 3n

D. less then 3n

Answer: D

Watch Video Solution

67. 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

68. Assertion: If the tension in the string is doubled, then frequency of fundamental node becomes two times.

Reason: According to law of tension, frequency $\propto (\text{tension})^{1/2}$

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

69. 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

70. A tuning fork of frequency $500H_Z$ is sounded on a resonance tube . The first and second resonances are

obtined at $17cm$ and $52cm$. The velocity of sound is

A. 170

B. 350

C. 340

D. 300

Answer: B

Watch Video Solution

71. In order to increase the frequency of transverse oscillations of a stretched wire by 50%, its tension munst be increased by

A. 0.5

B. 1

C. 1.25

D. 1.5

Answer: C

Watch Video Solution

Competitive Thinking

1. In a stationary wave

A. in each time period all particles come to rest twice simultaneously.

B. in each time period,allpartiles coem to rest once simultanesouly.

C. all the particles never remain at rest simultaneously.

D. all the particles never remain at rest

Answer: A

 Watch Video Solution

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

A. Amplitude

B. Frequency

C. Propogation of energy

D. Phase of the wave

Answer: C

Watch Video Solution

3. 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. $z_1 + z_2$

Answer: A

Watch Video Solution

4. The energy is not transformed in the following

A. Sound waves

B. Visible waves

C. Progressive waves

D. Stationary waves

Answer: D

Watch Video Solution

5. Amplitude of vibration in stationary wave is

A. maximum at nodes.

B. zero at nodes

C. maximum at nodes and antinodes

D. equal to all the points

Answer: B

Watch Video Solution

6. Node is that point in longitudinal stationary waves where pressure

A. difference is maximum

B. is maximum

C. is minimum

D. difference is minimum

Answer: A

Watch Video Solution

7. What is nature of waves on stretched sonometer wire ?

A. Transverse progressive polarised

B. Longitudinal progressive polarised.

C. Transverse stationary polarised.

D. Unpolarised

Answer: C

 Watch Video Solution

8. Consider a wire of length L, density ρ and Young's modulus Y . If l is elongation in wire, then frequency of wire is

A. $\frac{1}{2L}\sqrt{\frac{Yl}{\rho L}}$

B. $\frac{1}{2L}\sqrt{\frac{YL}{\rho l}}$

C. $\frac{1}{L}\sqrt{\frac{YL}{\rho l}}$

D. $\frac{1}{L}\sqrt{\frac{Yl}{\rho L}}$

Answer: A

Watch Video Solution

9. A string is stretched within two rigid ends. It is vibrated in a node of first overtone. Which of the following is formed at a middle point of a string ?

A. Antinode

B. Node

C. Either node or antinode

D. Neither node nor antinode

Answer: B

Watch Video Solution

10. Two copper wires of radii r_1 and $r_2(r_1 > r_2)$ are subjected to same tension and are plucked. Transverse wave will

A. travel faster in thicker wire

B. travel faster in thinner wire

C. travel with same velocity in both wires

D. do not trave through both wires.

Answer: B

Watch Video Solution

11. Two strings A and B made of same material are stretched by same tension. The radius of string A is double of the radius of B. A transverse wave travels on A with speed v_A and on B with speed v_B. The ratio $\frac{v_A}{v_B}$ is

A. $\frac{1}{4}$

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

C. 2

D. 4

Answer: B

Watch Video Solution

12. The length and diameter of a metal wire is doubled the fundamental frequency of vibration will change from n to (tension being kept constant and material of both the wires is same)

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

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

C. $\frac{n}{12}$

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

Answer: A

Watch Video Solution

13. In a string, stationary waves are produced by

A. interference

B. diffraction

C. beats

D. superposition

Answer: D

 Watch Video Solution

14. 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 shaphe amplitude $A/3$

B. sinusoidal shaphe amplitude $A/2$

C. sinusoidal shaphe amplitude A.

D. straight line

Answer: D

Watch Video Solution

15. 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

16. 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

17. 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 cm

B. 80cm

C. 40 cm

D. 120cm

Answer: B

Watch Video Solution

18. 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. 4 m/s

B. 20 m/s

C. 10 m/s

D. 5 m/s

Answer: B

Watch Video Solution

19. A string is vibrating in its fifth overtone between two rigid supports 2.4 m apart. The distance between successive node and antinode is

A. $0.1m$

B. $0.2m$

C. $0.6m$

D. $0.8m$

Answer: B

Watch Video Solution

20. 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 times

Answer: C

Watch Video Solution

21. n number of waves are produced on a string in 0.5 s. Now, the tension in the string is doubled (Assume length and radius constant), the number of waves produced in 0.5s for the same harmonic will be

A. n

B. $\sqrt{2}n$

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

D. $\frac{n}{\sqrt{5}}$

Answer: B

Watch Video Solution

22. Length of 0.3m wire vibrates in fundamental mode at frequency 480 Hz. The velocity of sound wave in air is

A. 330 m/s

B. 320 m/s

C. 330 m/s

D. 288 m/s

Answer: D

Watch Video Solution

23. If a stationary waves is incidnet on a rigid wall, then the distance between wall and first antinode is (its velocity is 36m/s and frequency 72 Hz)

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

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

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

D. 1m

Answer: C

Watch Video Solution

24. The number of nodes and antinodes formed on a sonometer wire vibrating in second overtone are respectively.

A. 2 node,2 3 antinodes

B. 3 nodes, 2 antinodes

C. 4 nodes, 2-antinodes

D. 3 nodes, 4 antinodes

Answer: C

Watch Video Solution

25. In sonometer experiment , the string of length 'L' under tension vibrates iin second overtone between two bridges. The amplitude of vibration is maximum at

A. $\frac{L}{3}, \frac{2L}{3}, \frac{5L}{6}$

B. $\frac{L}{8}, \frac{L}{4}, \frac{L}{2}$

C. $\frac{L}{2}, \frac{L}{4}, \frac{L}{6}$

D. $\frac{L}{6}, \frac{L}{2}, \frac{5L}{6}$

Answer: D

Watch Video Solution

26. A uniform rope of legnth L and mass m_1 hangs vertically from a rigid support. A block of mass m_2 is attached to the free end of the rope. A transverse pulse of wavelength λ_1 is produced at the lower end of the rope. The wavelength of the pulse when it reaches the top of the rope is λ_2. The ratio $\frac{\lambda_2}{\lambda_1}$ is

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

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

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

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

Answer: D

Watch Video Solution

Watch Video Solution

27. 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 incrased

D. T_1 was kept constant

Answer: B

Watch Video Solution

28. 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. $13.5m$

B. $2.7cm$

C. $5.4cm$

D. $10.3cm$

Answer: A

Watch Video Solution

29. 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

30. A uniform string of length L and mass M is fixed at both end while it is subject to a tension T. It can vibrate at frequencies v given bby the formula (where, $n = 1, 2, 3, \ldots\ldots\ldots\ldots)$

A. $v = \frac{n}{2}\sqrt{\frac{T}{ML}}$

B. $v = \frac{n}{2L}\sqrt{\frac{T}{M}}$

C. $v = \frac{1}{2n}\sqrt{\frac{T}{ML}}$

D. $v = \frac{n}{2}\sqrt{\frac{TL}{M}}$

Answer: A

Watch Video Solution

Watch Video Solution

31. The transverse displacement of a vibrating string is

$y = 0.06\sin\frac{\pi}{3} \times \cos(120\pi)$

If mass per unit length of the string is $2 \times 10^{-2} kgm^{-1}$, the tention in the string will be

A. 648 N

B. 864 N

C. 684 N

D. 468 N

Answer: A

Watch Video Solution

32. 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

33. 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. 2 Hz

B. 4 Hz

C. 5 Hz

D. 10 Hz

Answer: C

Watch Video Solution

34. In a sonometer experiment the bridges are separted by a fixed distance the wire which is slightly elastic emits a tone of frequency n when held by tension T If the tension is increased to 4T the tone emitted by the wire will be of frequency

A. n

B. 2n

C. slightly greater than 2n

D. slightly less than 2n

Answer: D

Watch Video Solution

35. 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

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

A. 5 N

B. 20 N

C. 40 N

D. 80 N

Answer: C

Watch Video Solution

37. A sonometer wire of length l_1 is in reasonance with a frequency 250 Hz. If the length of wire is increasesed then 2 beats per second are heard. What is ratio of the lengths of the wire ?

A. $\frac{125}{126}$

B. $\frac{126}{125}$

C. $\frac{124}{125}$

D. $\frac{125}{124}$

Answer: D

Watch Video Solution

38. The length of vibrating wire is 60cm and frequency is 110Hz. When the length is decreased frequency is 110Hz. When the length is decreased by 5 cm, then the number of beats produced is

A. 10

B. 6

C. 5

D. 8

Answer: A

Watch Video Solution

39. A sonometer wire is in unison with a tuning fork.When its lengths increases by 4%, it gives 8 beats per secon with the same the fork. The frequency of the fork is

A. 196 Hz

B. 200 Hz

C. 204 Hz

D. 208 Hz

Answer: B

 Watch Video Solution

40. 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

41. 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

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

A. 5

B. 7

C. 8

D. 3

Answer: B

Watch Video Solution

43. 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 strings vibrate in their fundamental modes, the one of length L with frequency n_1 and the other with frequency n_2 the ratio n_1 / n_2 is given by

A. 2

B. 4

C. 8

D. 1

Answer: D

Watch Video Solution

Watch Video Solution

44. Two uniform wires of a the same material are vibrating under the same tension. If the first overtone of the first wire is equal to the second overtone of the second wire and radius of the first wire is twice the radius of the second wire, then the ratio of the lengths of the first wire to second wire is

A. $\frac{1}{3}$

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

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

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

Answer: A

Watch Video Solution

45. 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. $\frac{n}{4}$

B. $\sqrt{2}n$

C. n

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

Answer: C

Watch Video Solution

46. When the length of the vibrating segment of a sonometer wire is increased by 1% the percentage change in its frequency is

A. $\frac{100}{101}$

B. $\frac{99}{100}$

C. 1

D. 2

Answer: C

Watch Video Solution

47. A $20cm$ long string, having a mass of $1.0g$, is fixed at both the ends. The tension in the string is $0.5N$. The string is into vibrations using an external vibrator of frequency $100Hz$. Find the separation (in cm) between the successive nodes on the string.

A. 15 cm

B. 5 cm

C. 25 cm

D. 22 cm

Answer: B

Watch Video Solution

48. When a string is divided into three segments of lengths l_1, l_2 and l_3 the fundamental frequencies of these three segments are v_1, v_2 and v_3 respectively. The original fundamental frequency (v) of the string is

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

B. $v = v_1 + v_2 + v_3$

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

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

Answer: C

Watch Video Solution

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

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

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

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

D. $n = n_1 + n_2 + n_2 + n_3$

Answer: A

Watch Video Solution

50. The waves set up in a closed piep are

A. Longitudinal and Prograssive

B. Transverse and Stationary

C. Transverse and Stationary

D. Longitudinal and Stationary

Answer: D

Watch Video Solution

51. What is distance between sucessive node and antinode when open pipe vibrates in fundamental mode ?

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

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

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

D. λ

Answer: B

Watch Video Solution

52. With increases in temperature the frequency of sound in an organ pipe

A. increases.

B. decreases

C. remains unchanged

D. cannot be determined

Answer: A

Watch Video Solution

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

A. pipeis 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

54. A pipe closed at one end has length 83 cm. The number of possible natural oscilations of air column whose frequencies lie below 1000 Hz are (take, velocity of sound in air 332 m/s)

A. 3

B. 4

C. 5

D. 6

Answer: C

Watch Video Solution

55. A pipe has a fundamental frequency 100 Hz and it second ovetone is 500 Hz. The pipe is

A. closed at one end

B. closed at boths ends

C. open at both ends

D. cannot be predicted.

Answer: A

Watch Video Solution

56. An open and closed organ pipe have the same length the ratio pth mode of frequency of vibration of air in two pipe is

A. $p(2n+1)$

B. $\frac{2p}{2p-1}$

C. p

D. 1

Answer: B

Watch Video Solution

57. An air column, closed at one end and open at the other, resonates with a tunning fork when the smallest length of the coloumn is 50 cm. The next larger length of the column resonating with the same tunning fork is

A. 150 cm

B. 200 cm

C. 66.7 cm

D. 100 cm

Answer: A

Watch Video Solution

58. If the lengths of a closed rogan pipe is $1.5m$ and velocity of sound is 330m/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

59. If fundamental frequency of closed pipe is 50 Hz, then frequency of 2^{nd} ovetone is

A. 100 Hz

B. 50 Hz

C. 250 Hz

D. 150 Hz

Answer: C

Watch Video Solution

60. Speed of sound is air is 340 m/s. The length of air column is 34 cm. The frequency of 5^{th} overtone of pipe closed at one end is

A. 200 Hz

B. 2750Hz

C. 2500 Hz

D. 2800 Hz

Answer: B

Watch Video Solution

61. The fundamental frequency of a closed pipe, if its first overtone is unison with a tuning fork of 480 Hz is

A. 120 Hz

B. 320 HZ

C. 160 Hz

D. 240 Hz

Answer: C

 Watch Video Solution

62. 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

63. In fundamental mode, the time required for the sound wave to reach upto the closed end of a pipe filled with air is $0.01s$. The frequency of vibration of air column is

A. $2.5Hz$

B. 15 Hz

C. 20 Hz

D. 25 Hz

Answer: D

Watch Video Solution

64. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?

A. 10 Hz

B. 20 HZ

C. 30 Hz

D. 40 Hz

Answer: B

Watch Video Solution

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

A. $303ms^{-1}$

B. $332ms^{-1}$

C. $323.2ms^{-1}$

D. $300ms^{-1}$

Answer: C

Watch Video Solution

66. A source of frequncy 340 Hz is kept above vertical cylindrical tube closed at lower end. The length of the tube is 120 cm. Water is slowly poured in just enough to produce resonance. The the minimum height (velocity of sound =340 m/s) of the water level in the tube for that resonance is.

A. $0.75m$

B. $0.25m$

C. $0.95m$

D. $0.45m$

Answer: D

Watch Video Solution

67. While measuring the speed of sound by performing a resonance column experiment, a student gets the first resonance condition at a column length of $18cm$ during winter. Repeating the same experiment during summer, she measures the column length to be xcm for the second resonance. Then

A. $x > 54$

B. $54 > x > 36$

C. $36 > x > 36$

D. $18 > x$

Answer: A

Watch Video Solution

68. A student is performing the experiment of resonance column. The diameter of the column tube is $4cm$. The frequency of the tuning fork is $512Hz$ The air temperature is $38.^{\circ} C$ in which the speed of sound is $336m/s$. The zero of the meter scale coincides with the top end of the resonance column tube. When the first resonance occurs, the reading of the water level in the column is.

(a) $14.0cm$

(b) $15.2cm$

(c) $6.4cm$ (d) $17.6cm$.

A. $14.0cm$

B. $15.2cm$

C. $16.4cm$

D. $17.6cm$

Answer: B

Watch Video Solution

69. 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. $0.0.12m$

B. $0.025m$

C. $0.05m$

D. $0.024m$

Answer: B

Watch Video Solution

70. In a resonance tube experiment, two successive resonances are heard at 15 cm 48 cm. End correction

will be

A. $1.5cm$

B. 3 cm

C. 2.5 cm

D. 1 cm

Answer: A

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71. In a resonance tube experiment resonances occurs when length of air column is 0.2 m and again when it is 0.62m. The internal diameter of the pipe is

A. $2.33cm$

B. $3.33cm$

C. $4.33cm$

D. $5.33cm$

Answer: B

Watch Video Solution

72. Air is blown at the mouth of an open tube of lenghts 25 cm and diameter 2 cm. If the velocity of sound in air is $330ms^{-1}$, then emitted frequencies are (in Hz)

A. $660, 1320, 2640$

B. $660, 1000, 3300$

C. $302, 664, 1320$

D. $330, 990, 1690$

Answer: A

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73. The fundamental frequency of an air column in a pipe closed at one end is 100 Hz. If the same pipe is open at both the ends, the frequencies produced in Hz are

A. $100, 200, 300, 400, \ldots$

B. $100, 300, 500, 700, \ldots$

C. $200, 300, 400, 500, . .$

D. $200, 400, 600, 800, \ldots$

Answer: D

Watch Video Solution

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

A. Open end will be antinode

B. Odd harmocis of the fundamental frequency will be generated

C. All harmonics of the fundamental frequency will be generated.

D. Pressure change will be maximum at both ends.

Answer: D

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75. If the end correction of an open pipe is 0.8 cm, then the inner radius of that pipe will be

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

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

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

D. $0.2cm$

Answer: B

Watch Video Solution

76. 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. 50 cm

B. 100 cm

C. 75 cm

D. 25 cm

Answer: A

Watch Video Solution

77. Length of an organ pipe open at both ends in 33.3 cm. If velocity of sound is 333 m/s.,then the frequency of fifth overtone is

A. 3000 Hz

B. 2500 Hz

C. 1500 Hz

D. 1250 Hz

Answer: A

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

A. 80 cm

B. 100 cm

C. 120 cm

D. 140 cm

Answer: C

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79. 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. $3:4$

D. $3:8$

Answer: D

Watch Video Solution

80. First overtone frequency of a closed pipe of lengths l_1 is equl to the 2^{nd} harmonic frequency of an open pipe of lengths l_2 the ration $\frac{l_1}{l_2}$

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

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

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

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

Answer: A

 Watch Video Solution

81. An organ pipe closed at one end and another open at both ends will resonate with each other, if their lenghts are in the ratio

A. $2:1$

B. $1:4$

C. $1:1$

D. $1:2$

Answer: D

Watch Video Solution

82. Fifth overtone of closed organ pipe is in unison with fifth overtone of open organ pipe. The ratio of their lengths is

A. $\frac{12}{11}$

B. $\frac{11}{12}$

C. $\frac{5}{6}$

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

Answer: B

Watch Video Solution

83. For a certain organ pipe, three successive resonance frequencies are observed at 425, 595 and 765 Hz, respectively. The length of the pipe is

(speed of sound in air $340ms^{-1}$)

A. $0.5m$

B. 1 m

C. $1.5m$

D. 2 m

Answer: B

Watch Video Solution

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84. 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. 330 m/s

B. 340 m/s

C. 350 m/s

D. 300 m/s

Answer: B

Watch Video Solution

85. 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

86. A pipe open at both ends has a fundamental frequency f in air. The pipe is dippoed vertically in water so that half of it is in water. The fundamental frequency of the air column is now :-

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

B. 2f

C. f

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

Answer: C

Watch Video Solution

87. When open pipe is closed from one end, then third overtone of closed pipe is higher in frequency by 150 Hz than second overtone of open pipe. The fundamental frequency of open end pipe will be

A. 75 Hz

B. 150 Hz

C. 225 Hz

D. 300 Hz

Answer: D

Watch Video Solution

88. The lengths of an open organ pipe is twice the length of another closed organ pipe. The fundamental frequency of the open pipe is 100 Hz. The freqeuncy of the third harmonic of the closed pipe is

A. 100 Hz

B. j200 Hz

C. 300 Hz

D. 150 Hz

Answer: C

Watch Video Solution

89. An open pipe is resonance is its 2^{nd} harmonic with tuning fork of freqency f_1. Now it is closed at one end. If the frequency of the tuning fork is increases slowly from f_1, then agaain a resonance is obtained with a_1 frequency f_2. if in this case the pipe vibrates n^{th} harmonics, then

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

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90. 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

91. The lengths of two organ pipes open at both ends are L and $L+d$. If they are sounde together, then the beat frequency will be

A. $\frac{2Vd}{L(L+d)}$

B. $\frac{Vd}{L(L+d)}$

C. $\frac{2L(L+d)}{Vd}$

D. $\frac{Vd}{2L(L+d)}$

Answer: D

Watch Video Solution

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

A. 4 L

B. L

C. 2L

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

Answer: C

Watch Video Solution

93. The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is

A. $13.2m$

B. $8cm$

C. $12.5cm$

D. $16cm$

Answer: A

Watch Video Solution

94. A pipe of lengths 10 cm, closed at one edn, has frequency equal to half the 2^{nd} overtone of another pipe open at the ends. The lengths of the open pipe is

A. 10 cm

B. 20 cm

C. 35 cm

D. 30 cm

Answer: D

Watch Video Solution

95. A sources of sound is at one end of hallow tube. An observer at other end hears two distinct notes aftea time interval of 1s.If velocity of sound in air is 340 m/s and in metal is 3740 m/s , then lengths of pipe is

A. 374 m

B. 324 m

C. 340 m

D. 347 m

Answer: A

Watch Video Solution

96. The frequency of vibration of air column in a pipe closed at one end is $n_1$and that of the one closed at both end is n_2. When both the pipes are joined to form a pipe closed atone end, the frequency of vibration of air column in it is (neglecting end correction)

A. $\frac{n_1 n_2}{2n_2 + n_1}$

B. $\frac{2n_1 - n_2}{n_1 + n_2}$

C. $\frac{n_1 n_2}{2n_1 + n_2}$

D. $\frac{n_1 + n_2}{n_n - n_2}$

Answer: C

Watch Video Solution

97. In a pipe opened at both ends n_1 and n_2 be the frequencies corresponding to vibrating lengths L_1 and L_2 respectively .The end correction is

A. $\frac{n_1 l_2 - n_2 l_2}{2(n_1 - n_2)}$

B. $\frac{n_2 l_2 - n_1 l_1}{2(n_2 - n_1)}$

C. $\frac{n_2 l_2 - n_1 l_1}{2(n_1 - n_2)}$

D. $\frac{n_1 l_1 - n_2 l_2}{(n_1 - n_2)}$

Answer: C

Watch Video Solution

98. A stretched string of 1 m lengths and mass 5×10^{-4} having tension of 20 N. if it is plucked at 25 cm from one end, then it will vibrate with frequency

A. 100 Hz

B. 200 Hz

C. 256 Hz

D. 400 Hz

Answer: B

 Watch Video Solution

99. 4 loops are formed in 80 cm wire. The wavelengths of waves is

A. 40 cm

B. 80cm

C. 160 cm

D. 200 cm

Answer: D

Watch Video Solution

100. In Melde's experiment ,when the tension decreases by 0.011 kg-wt, the number of loop changes from 5 to 6, then what is the initial tension ?

A. 0.036 kg-wt

B. 0.016 kg-wt

C. 0.032 kg-wt

D. 0.011 kg-wt

Answer: A

View Text Solution

101. For air at room temperature the atmospheric pressure is $1.0 \times 10^5 Nm^{-2}$ and density of air is 1.2 Kg m^{-3}. For a tube of tength 1.0 m closed at one end the lowest frequency generated is 84 Hz. The value of γ (ratio of two specific heats) for air is

A. 2.1

B. 1.5

C. 1.8

D. 1.4

Answer: D

View Text Solution

102. A source of unknown frequency gives 4 beats//s, when sounded with a source of known frequency 250 Hz. The second harmonic of the source of unknown frequency gives five beats per second, when sounded with a source of frequency 513 The unknown frequency is

A. 245 Hz

B. 246 Hz

C. 240 Hz

D. 260 Hz

Answer: A

Watch Video Solution

103. 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

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104. 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. 5.06km/s

B. 6.06 km/s

C. 7.06 km/s

D. 8.06 km/s

Answer: A

Watch Video Solution

105. A string is stretched between fixed points separated by $75.0cm$. It is observed to have resonant frequencies of $420Hz$ and $315Hz$. There are no other resonant frequencies between these two. Then, the lowest resonant frequency for this string is

A. 1.05 Hz

B. 1050 Hz

C. 10.5 Hz

D. 105 Hz

Answer: D

Watch Video Solution

106. Two identical piano wires have fundemental frequency of $600\ vib/\sec$, when kept under the same tension. What frectional increase in the tension of one wire will lead to the occurrence of six beats per second when both wires vibrate simuitaneously?

A. 0.01

B. 0.02

C. 0.03

D. 0.04

Answer: B

Watch Video Solution

107. The equation of a wave on a string of linear mass density $0.04kgm^{-1}$ is given by $y = 0.02(m)\sin\left[2\pi\left(\frac{t}{0.04(s)} - \frac{x}{0.50(m)}\right)\right]$. The tension in the string is :

A. 6.25 N

B. 4.0 N

C. 12.5 N

D. 0.5 N

Answer: A

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108. The transverse displacement of a string clamped at its both ends is given by $y(x, t) = 0.06 \sin\left(\frac{2\pi}{3}x\right)\cos(l20\pi t)$ where x and y

are in m and t in s. The length of the string is 1.5 m and its mass is 3×10^{-2} kg. The tension in the string is

A. 81 N

B. 162 N

C. 90 N

D. 180 N

Answer: B

Watch Video Solution

109. A uniform string of length $20m$ is suspended from a rigid support. A short wave pulse is introduced at its

lowest end. It starts moving up the string. The time taken to reach the support is :

(take $g = 10ms^{-2}$)

A. 2s

B. $2\sqrt{2}s$

C. $\sqrt{2}s$

D. $2\pi\sqrt{2}s$

Answer: B

Watch Video Solution

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

A. 204 cm/s

B. 110 cm/s

C. 58 cm/s

D. 80 cm/s

Answer: D

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111. A tuning fork is used to produce resonance in glass tuve. The length of the air column in the tube can be adjusted by a variable piston. At room temperature of $27^\circ C$ two succesive resonance are produced at 20 cm and 73 cm column length. If the frequency of the tuning fork is 320 Hz. the velocity of sound is air at $27^\circ C$ is

A. 330m/s

B. 339m/s

C. 350m/s

D. 300m/s

Answer: B

Watch Video Solution

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

A. 2

B. 6

C. 8

D. 7

Answer: D

Watch Video Solution

113. 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 $\left(Y = 9 \times 10^{10} N/m^2\right)$

A. 40 Hz

B. 35 Hz

C. 30 Hz

D. 25 Hz

Answer: B

Watch Video Solution

114. A vibrating string of certain length l under a tension T resonates with a mode corresponding to the first overtone (third harmonic) of an air column of length $75cm$ inside a tube closed at one end. The string also generates 4 beats per second when excited along with a tuning fork of frequency n. Now when the tension of the string is slightly increased the number

of beats reduces 2 per second. Assuming the velocity of sound in air to be $340m/s$, the frequency n of the tuning fork in Hz is

A. 344

B. 336

C. 117.3

D. 109.3

Answer: A

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115. A granite rod of 60 cm length is clamped at its middle point and is set into longitudinal vibrations. The density of granite is $2.7 \times 10^3 kg/m^3$ and its Young's modulus is 9.27×10^{10} Pa. What will be the fundamental frequency of the longitudinal vibrations ?

A. 10 kHz

B. 7.5 kHz

C. 5 kHz

D. 2.5 kHz

Answer: C

Watch Video Solution

116. 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

117. A tuning fork of frequency 340 Hz is vibrated just above the tube of 120 cm height. Water is poured slowly in the tube. What is the minimum height of water necessary for the resonance? (speed of sound in the air = 340m/s)

A. 15 cm

B. 25 cm

C. 30 cm

D. 45 cm

Answer: D

Watch Video Solution

118. An organ pipe closed at one end has fundamental frequency of $500Hz$. 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

119. What is phase difference between two waves, if the resultant amplitude due to their superposition is same as that of the waves?

A. $\pi / 2$

B. π

C. $2\pi / 3$

D. none of these

Answer: C

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120. In Melde's experiment in parallel position the mass of the pan is M_0. When a mass m_1 is kept in the pan, the number of loops formed is p_1. For the mass m_2, the number of loops, formed is p_2. Then the mass of the pan M_0, in terms of m_1, m_2, p_1 and p_2 is given by

A. $m_0 = \dfrac{p_1^2 - p_2^2}{m_2 p_2^2 - m_1 p_1^2}$

B. $m_0 = \dfrac{m_2 p_2^2 - m_1 p_1^2}{p_1^2 - p_2^2}$

C. $m_0 = \dfrac{m_2 p_2^2 + m_1 p_1^2}{p_1^2 - p_2^2}$

D. $m_0 = \dfrac{m_2 p_2^2 - m_1 p_1^2}{p_1^2 + p_2^2}$

Answer: B

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121. A pipe of length $85cm$ is closed from one end. Find the number of possible natural oscillations of air column in the pipe whose frequencies lie below $1250Hz$. The velocity of sound in air is $34m/s$.

A. 12

B. 8

C. 6

D. 4

Answer: C

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122. The closed and open organ pipes have same length. When they are vibrating simultaneously in first overtone, produces three beats. The length of open pipe is made $\frac{1^{rd}}{3}$ and closed pipe is made three time the original the number of beats produced will be

A. 8

B. 14

C. 17

D. 20

Answer: C

Watch Video Solution

123. A sonometer wire of length $1.5m$ is made of steel. The tension in it produces an elastic strain of 1%. What is the fundamental frequency of steel if density and elasticity of steel are $7.7 \times 10^3 kg/m^3$ and $2.2 \times 10^{11} N/m^2$ respectively ?

A. 188.5 Hz

B. 178.2 Hz

C. 200.5 Hz

D. 770 Hz

Answer: B

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Evaluation Test

1. Assertion: If two tuning forks are sonuded together, they produce 5 beats/s. If by putting wax on one tuning fork, beat frequency increases to 6 beats/s, then one can conclude that wax is put on tuning fork with lesser frequency.

A. Assertion is true and Reason is correct explanation of Assertion.

B. Assertion is true and Reason is false

C. Assertion and Reason both are false

D. Assertion is false but Reason is true.

Answer: D

View Text Solution

2. An open organ pipe of length L vibrates in its fundamental mode. The pressure variation is maximum

A. at the two ends

B. at the middle of the pipe

C. at distances $\frac{L}{4}$ inside the ends

D. at distances $\frac{L}{8}$ inside the ends

Answer: B

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3. In an organ pipe whose one end is at x =0, the presence is expressed by $P = P_0 \cos \frac{3\pi x}{2} \sin 300\pi t$ where x is in meter and t in sec. The organ pipe can be :-

A. closed at one end, open at another with length=0.5 m

B. open at both ends, length=1 m

C. closed at both ends, length =2 m

D. closed at one end, open at another with length

$= \frac{2}{3}$ m

Answer: C

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4. A standing wave is maintained in a homogeneous string of corss-sectional area 'S' and density phe. It is formed by the superposition of two waves travelling in opposite directions given by the equation $y_1 = a\sin(\omega t = kx)$ and $y_2 = 2a\sin(\omega t + kx)$. The total mechanical energy confined between the sections corresponding to the abjacent antinodes is:

A. $\frac{3\pi sp\omega^2 a^2}{2k}$

B. $\frac{\pi sp\omega^2 a^2}{2k}$

C. $\frac{5\pi sp\omega^2 a^2}{2k}$

D. $\frac{2\pi sp\omega^2 a^2}{2k}$

Answer: C

View Text Solution

5. In a stationary wave that forms as a result of reflection of wave from an obstacle, the ratio of this amplitude at an antinode to the amplitude at node is n. The fraction of energy reflected is

A. $[(X-1)X]^2$

B. $[X/(X+1)]^2$

C. $[(X-1)/(X+1)]^2$

D. $[1/X]^2$

Answer: C

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6. The funduamental frequency of a sonometer wire of length l is n_0. A bridge is now introduced at a distance of $\Delta l(<<l)$ from the centre of the wire. The lengths of wire on the two sides of the bridge are now

vibrated in their fundamental modes. Then, the beat frequency is nearly

A. $n_0(\Delta l)/l$

B. $8n_0(\Delta l)/l$

C. $2n_0(\Delta l)/l$

D. $n_0(\Delta l)/2l$

Answer: B

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7. A pipe open at the top end is held vertically with some of its lower portion dipped in water. At a certain

depth of immersion, the air column of length 3/8 m in the pipe resonates with a tuning fork of frequency 680 Hz. The speed of sound in air is 340 m/s. The pipe is now raised up by a distance 'X' until it resonates in the next overtone' with the same tuning fork. The value of 'X' is

A. 20 cm

B. 40 cm

C. 50 cm

D. 25 cm

Answer: D

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8. Assertion: The length of the glass tube in air column resonating experiment is 75 cm. If velocity of sound in air is $330ms^{-1}$, The experiment connot be performed with a tuning fork o frequency n=482 Hz.

Reason: If l_2 and l_1 are first and second resonating lengths in air column resonating experiment, then velocity of sound $V = 2n(l_2 - l_1)$

A. Assertion is true and Reason is correct explanation of Assertion.

B. Assertion is true and Reason is false

C. Assertion and Reason both are false

D. Assertion is false but Reason is true.

Answer: D

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

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

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

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

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

Answer: B

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10. 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. pluck at l/4 and touch at 3/4

B. pluck at l/4 and touch at l/2

C. pluck at l/4 and touch at 3/4

D. pluck at l/2 and touch at l/4

Answer: B

Watch Video Solution

11. Waves of frequency $1000Hz$ are produced in a Kundt's tube . The total distance between 6 successive nodes is $82.5cm$. The speed of sound in the gas filled in the tube is

A. $300ms^{-1}$

B. $330ms^{-1}$

C. $360ms^{-1}$

D. $390ms^{-1}$

Answer: B

Watch Video Solution

12. A uniform string fixed at both ends vibrates in a resonant mode with a separation of 2.0 cm between the consecutive nodes. For next higher resonant frequency, this separation is reduced to 1.6 cm. The length of the string is

A. 4.0 cm

B. 8.0 cm

C. 12.0 cm

D. 16.0 cm

Answer: B

Watch Video Solution

13. A taut string at both ends viberates in its n^{th} overtone. The distance between adjacent Node and Antinode is found to be 'd'. If the length of the string is L, then

A. 2d(n+1)

B. d (n+1)

C. 2dn

D. 2d (n-1)

Answer: A

Watch Video Solution

14. A compsits wire fixed at both ends consists of two uniform parts having length l and 4l and mass per unit lengths μ and 4μ respectively. Then in fundamental mode of vibration, wavelength in heavy wire, keeping junction as node, is

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

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

C. l

D. None of these

Answer: C

View Text Solution

15. Assertion : Two points in adjacent loops of a string wave in the case of standing wave formation attain their maximum kinetic energy simultaneously.

Reason: The two points in the adjacent loops of standing wave are out of phase exactly by π.

A. Assertion is true and Reason is correct explanation of Assertion.

B. Assertion is true and Reason is false

C. Assertion and Reason both are false

D. Assertion is false but Reason is true.

Answer: A

View Text Solution

16. A wire of identical length and cross-section is used for fixed vibration between two rigid supports slightly more than the length of string. The wire has Young's Modulus =2Y and mass per unit length $= \mu/2$ and v is the fundamental frequency. Find frequency in the 2^{nd} mode of this wire.

A. v

B. 2v

C. 3v

D. 6v

Answer: B

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