PHYSICS

BOOKS - CHETANA PUBLICATION

Superposition of Waves

Example

1. What is wave motion ?

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2. What are sound waves ?

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3. What is wave pulse ?

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4. What are common properties of waves ?

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5. What is the minimum distance any two particles of a medium which always have the same speed if a sine wave travels through the medium ?

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6. What are mechanical waves ?

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7. What is transferred by the particles when a mechanical wave transmits in the medium

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8. What is electromagnetic waves?

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9. Define progressive wave or a travelling wave.

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10. Write the mathematical equation representing a progressive wave travelling in the negative x-direction with constant speed v.

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11. A wave is represented by an equation $y = A\sin(Bx + Ct)$. Given that the constants A, B and C are positive , can you tell in which direction the wave is moving ?

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12. Write the mathematical equation representinga progressive wave travelling in the positivex-direction with constant speed upsilon. Explain the notations used in the equation.

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13. State the characteristics of progressive wave?

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14. What is the major difference between transverse and longitudinal waves?

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15. The amplitude of a wave is represented by $y = 0.2 \sin 4(\pi)\left[\frac{t}{0.08} - \frac{x}{0.8}\right]$ in SI units. Find

wave length

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16. The amplitude of a wave is represented by $y = 0.2 \sin 4(\pi)\left[\frac{t}{0.08} - \frac{x}{0.8}\right]$ in SI units.

Find

frequency

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17. The amplitude of a wave is represented by $y = 0.2 \sin 4(\pi)\left[\frac{t}{0.08} - \frac{x}{0.8}\right]$ in SI units.

Find

amplitude of the wave

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18. Explain reflection of waves?

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19. Explain reflection of transverse wave whena wave pulse travels from a rarer to a denser medium.

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20. Explain reflection of transverse wave whena wave pulse is sent from a denser to a rarer medium.

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21. Explain reflection of transverse wave whena wave pulse is sent from a denser to a rarer medium.

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22. Explain reflection of longitudinal wave travelling from rarer to denser medium.

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23. Explain reflection of longitudinal wave travelling from denser to rarer medium.

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24. Explain reflection of transverse wave when a wave pulse is sent as a crest from. Rarer to denser medium.

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25. Explain reflection of transverse wave when a wave pulse is sent as a crest from. Denser to rares medium

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26. Explain reflection of transverse wave when a wave pulse is sent as a crest from. Denser to rares medium

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27. Which Principle is used to create antisound?

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28. Give some examples of principle of superposition of waves?

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29. Explain principle of superposition of waves.

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30. Explain superposition of two pulses of equal amplitude and same phases moving

towards each other.

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31. Explain superposition of two pulses of equal amplitude and opposite phase moving towards each other.

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32. What is constructive and destructive interference?

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33. What is antisound?

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34. Derive an equation produced due to superposition of two waves.

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35. Find the amplitude of the resultant wave produced due to interference of two wavesand what will be resultant amplitude when thewaves are. in phase and

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36. Find the amplitude of the resultant waveproduced due to interference of two wavesand what will be resultant amplitude when thewaves are. Out of phase.

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37. What will be intensities of the waves whenthe waves interfere . In phase and

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38. What will be intensities of the waves whenthe waves interfere . Out of phase.

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39. The displacements of two sinusoidal waves propagating through a string are given by the following equations.

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40. A progressive wave travels on a stretched string. A particle on this string takes $4.0ms$ to move from its mean position to one of its extreme positions. The distance between two consecutive points on thew streing which are at their mean positions (at a certain time

instant) is $2.0cm$. Find the frequency , wavelength and speed of the wave.

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41. A wave of frequency $500Hz$ is travelling with a speed of $350\frac{m}{s}$.

What is the phase difference between two displacements at a certain point at times $1.0ms$ apart ?

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42. What is stationary wave ?

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43. Name two musical instruments based on the principal of stationary waves.

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44. What is longitudinal stationary waves ?

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45. What are stationary waves? Why they are calledstationary waves?

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46. What are nodes and antinodes?

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47. State the characterstic of stationary waves.

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48. Derive an expression for equation of stationarywave on a stretched string.

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49. Derive an expression for equation of stationary wave on a stretched string. Show that nodes and antinodes are equally spaced.

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50. Explain formation of stationary wave on astretched string. Show that the distance between node and adjacent antinode is $\lambda/4$.

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51. Find the distance between two successive nodes in a stationary wave on a string vibrating with frequency $64Hz$. The velocity of progressive wave that resulted in the stationary wave is $48ms^{-1}$.

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52. A sound wave in a certain fluid medium is reflected at an obstacle to form a standing wave. The distance between two successive nodes is $3.75cm$ .If velocity of sound is $1500\frac{m}{s}$, find the frequency.

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53. Two sources of sound are separated by a distance 4 m. They both emit sound with the

same amplitude and frequency (330 Hz), but they are 180° out of phase. At what points between the two sources, will the sound intensity be maximum?

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54. Two sound waves travel at a speed of $330\frac{m}{s}$. If their frequencies are also identical and are equal to $540Hz$,what will be the phase difference between the waves at points $3.5m$

from one source and 3 m from the other if the sources are in phase ?

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55. What happens if a simple pendulum is pulled aside and released ?

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56. What happens when a guitar string is plucked ?

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57. How do vibrations of drill machine and washing machine differ from vibrations of simple pendulum?

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58. Do two tuning forks of different frequencies kept on table produce same vibrations.

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59. What is the resonance ?

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60. What is the formula for end correction in air?

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61. What is end correction ?

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62. What are harmonics and overtones ?

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63. Show that the fundamental frequency of vibrations of the air column in a tube open at both is equal to double the fundamental

frequency in a tube of the same length and closed at one end.

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64. Show that for pipe closed at one end, the end correction is e= $\frac{n_1 l_1 - n_2 l_2}{n_2 - n_1}$ where, the symbols have their usual meaning.

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65. Two organ pipes open at both ends have same diameter but different lengths. Show that end correction at each end is e= $(n_1 l_1 - n_2 l_2)/2(n_2 - n_1)$ where,the symbols have their usual meaning.

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66. Show that for pipe closed at one end, the end correction is e= $\frac{n_1 l_1 - n_2 l_2}{n_2 - n_1}$ where, the symbols have their usual meaning.

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67. State causes and and limitations of end correction.

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68. Show that only odd harmonics are present in the vibrations of air column in a pipe closed at one end.

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69. Show that even as well as odd (all) harmonics are present as overtones in the case of an air column vibrating in a pipe open at both ends.

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70. What is end correction ? Is the end correction same for a pipe open at both end and closed at one end ?

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71. An air column is of length Activity 17 cm long. Calculate the frequency of 5th overtone if the air column is

closed at one end (Velocity of sound in air = $340 ms^{-1}$).

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72. An air column is of length Activity 17 cm long. Calculate the frequency of 5th overtone if the air column is

open at both ends. (Velocity of sound in air = $340 ms^{-1}$).

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73. A closed pipe and an open pipe have the same length. Show that no mode of the closed pipe has the same wavelength as any mode of the open pipe.

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74. A pipe closed at one end can produce overtones at frequencies $640Hz$, $896Hz$ and $1152Hz$. Calculate the fundamental frequency

.

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75. A standing wave is produced in a tube open atboth ends. The fundamental frequency is 300 Hz. What is the length of tube? (speed of the sound = $340ms_1$)`.

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76. Find the fundamental , first overtone and second overtone frequencies of a pipe , open at both the ends , of length 25 cm if the speed of sound in air is $330\frac{m}{s}$.

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77. A pipe open at both the ends has a fundamental frequency of $600Hz$. The first overtone of a pipe closed at one end has the

same frequency as the first overtone of the open pipe. How long are the two pipes ?

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78. State the formula for the velocity of transverse waves on stretched wire and obtain an expression for fundamental frequency of vibration of stretched string.

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79. State and explain laws of vibrating strings ?

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80. State law of linear density and hence show that fundamental frequency of string is related to its radius and density.

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81. With neat diagram , explain various modes of vibration of a stretched string.

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82. For a stationary wave set up in a string having both ends fixed , what is the ratio of the fundamental frequency to the second harmonic ?

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83. A string is fixed at the two ends and is vibrating in its fundamental mode. It is known that the two ends will ba at rest. A part from these, is there any position on the string ich can be touched so as not to disturb the motion of the string? What will be the answer to this question if the string is vibrating in its first and second overtones?

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84. A string is fixed at both ends. What is the ratio of the frequency of the first harmonic to that of the second harmonic ?

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85. The velocity of a transverse wave on a string of length 0.5 is $225\frac{m}{s}$.

What is the fundamental frequency of a standing wave on this string if both ends are kept fixed ?

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86. The velocity of a transverse wave on a string of length 0.5 is $225\frac{m}{s}$.

While this string is vibrating in the fundamental harmonic , what is the wavelength of sound produced in air if the velocity of sound in air is $330\frac{m}{s}$?

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87. A string $105cm$ long is fixed at one end. The other end of string is moved up and down with frequency $15Hz$.A stationary wave, produced in the string , consists of 3 loops. Calculate the speed of progressive waves which have produced the stationary wave in the string.

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88. A string 1 m long is fixed at one end. The other end is moved up and down with frequency $15Hz$. Due to this , a stationary wave with four complete loops , gets produced on the string. Find the speed of the progressive wave which produces the stationary wave [Hint : Remember that the moving end is an antinode.]

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89. A violin string vibrates with fundamental frquency of $440Hz$. What are the frequencies of first and second overtones ?

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90. Two wires of the same material and same cross section are stretched on a sonometer. One wire is loaded with $1.5kg$ and another is loaded with 6 kg. The vibrating length of first wire is 60 cm and its fundamental frequency of

vibration is the same as that of the second wire. Calculate vibrating length of the other wire.

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91. State third law of vibrating string and explain how it can be verified using sonometer.

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92. State third law of vibrating string and explain how it can be verified using sonometer.

Watch Video Solution

93. State third law of vibrating string and explain how it can be verified using sonometer.

Watch Video Solution

94. State first law of vibrating string and explain how it can be verified using sonometer

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95. A sonometer wire of length 50 cm is stretched by keeping weights equivalent of 3.5 kg. The fundamental frequency of vibration is $125Hz$. Determine the linear density of the wire ?

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96. A wire has linear density $4.0 \times 10^{-3} k \frac{g}{m}$. It is stretched between two rigid supports with a tension of 360 N. The wire resonates at a frequency of $420 Hz$ and $490 Hz$ in two successive modes.Find the length of the wire.

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97. Two wires of the same material and the same cross section are stretched on a sonometer in seccuession. Length of one wire

is 60 cm and that of the other is 30 cm. An unknown load is applied to the first wire and second wire is loaded with 1.5 kg. if both the wires vibrate with the same fundamental frequencies, calculate the unknown load.

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98. A sonometer wire of length $0.5m$ is stretched by a weight of 5 kg. The fundamental frequency of vibration is $100Hz$.

Determine the linear density of material of wire.

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99. The string of a guitar is $80cm$ long and has a fundamental frequency of $112Hz$, If a guitarist wishes to produce a frequency of 160Hz where should the person press the string ?

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100. What are beats ?

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101. Define Doppler effect for sound waves?

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102. Define. Waxing

Watch Video Solution

103. Define. Waning

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104. Define frequency of beat.

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105. Define frequency of the wave ?

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106. Explain how velocity of air planes is calculated

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107. What is essential for obtaining Doppler effect for sound waves?

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108. What are beats ?

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109. Explain any two applications of beats.

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110. Explain production of beats and deduce analytically the expression for beat frequency.

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111. Two sound waves having wavelengths 81 cm and 82.5 cm produce 8 beats per second. Calculate the speed of sound in air.

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112. Two tuning forks having frequencies $320Hz$ and $340Hz$ are sounded together to produce sound waves. The velocity of sound in air is $326.4ms^{-1}$. Find the difference in wavelength of these waves.

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113. A set of 8 tuning forks is arranged in a series of increasing order of frequencies .Each fork gives 4 beats per second with the next one and the frequency of last fork is twice that of the first. Calculate the frequencies of the first and the last fork.

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114. A sonometer wire is stretched by tension of 40 N. It vibrates in unison with a tuning fork of frequewncy $384Hz$. How many numbers of beats get produced in two seconds if the tension in the wire is decreased by $1.24N$?

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115. Choose the correct option?

The characteristic of sound which

distinguishes a sharp sound from a grave or dull sound is

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116. Explain the term loudness. Give its unit and formula in decibel.

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117. Explain the terms Pitch and Timbre.

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118. Define Quality of sound

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119. In what range of pressure can a sound be heard by human.

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120. What is phon?

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121. On what quality of sound depends?

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122. On what factors does intensity of sound depends.

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123. What is different between noise and musical sound?

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124. Explain the term loudness. Give its unit and formula in decibel.

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125. Classify the main types of musical instruments and state their types with example.

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126. Distinguish between free vibrations and forced vibrations.

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127. Distinguish between overtone and harmonics .

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Exercise

1. Distinguish between progressive waves and stationary waves .

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2. Distinguish between stationary waves and beat.

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3. If two wavs,$Y_1 = 5\sin\pi(4t - 0.02x)$ and $Y_2 = 5\sin\pi(4t + 0.02x)$ in S.I. unit a superposed to produce stationary waves.Write down the equation of stationary

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4. If two wavs, $Y_1 = 5\sin 2\pi(2t - 0.02x)$ and $Y_2 = 5\sin 2\pi(2t - 0.02x)$ in S.I. unit a superposed to produce stationary waves. determine the distance between the consecutive nodes.

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5. If two waves, $Y_1 = 5\sin 2\pi(2t - 0.02x)$ and $Y_2 = 5\sin 2\pi(2t - 0.02x)$in S.I. unit superposed to produce stationary waves. Find Amplitude, frequency, wavelength and velocity

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6. If two wavs, $Y_1 = 5\sin 2\pi(2t - 0.02x)$ and $Y_2 = 5\sin 2\pi(2t - 0.02x)$ in S.I. unit a superposed to produce stationary waves. determine the distance between the consecutive nodes.

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7. If two waves,$Y_1 = 5\sin 2\pi(2t - 0.02x)$ and $Y_2 = 5\sin 2\pi(2t - 0.02x)$ in S.I. unit

superposed to produce stationary waves. Determine the distance between node and next antinode.

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8. The velocity of a transverse wave on a string of length 0.5 is $225\frac{m}{s}$.

What is the fundamental frequency of a standing wave on this string if both ends are kept fixed ?

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9. A wire of length 0.5 m is stretched by a weight of 2 kg. If the mass per unit length of the wire is $1.96 \times 10^{-3} kg/m$, find the fundamental frequency of the wire and the frequency of its first overtone

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10. A wire under a certain tension gives a note of fundamental frequency 320 Hz. When the tension is changed, the frequency of the

fundamental note changes to 480 Hz. Compare the tensions.

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11. Two wires of the same material and of the same diameter have their lengths in the ratio $1:3$ and are under tension in the ratio $1:4$ Compare their fundamental frequencies.

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12. A tuning fork gives 4 beats per second with a sonometer wire under tension of 26 N. If the tension on the wire is decreased to 24 N the number of beats remains the same before. What is the frequency of the tuning fork?

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13. A length of sonometer wire under constant tension when sounded with a tuning fork of higher frequency 271 Hz produced 5 beats per

second. If the length of the wire is reduced by 5%, find the new frequency of the wire.

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14. A length of 34 cm of a sonometer wire gives 5 beats per second with a tuning fork.It again gives 5 beats per second when the length of the wire is increased to35 cm. What is the frequency of fork?

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15. The difference between the frequencies of the first and second overtones of an air column closed at one end is 280 Hz. Find the frequency of its third overtone.

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16. What is the Fundamental frequency of vibration of an air column in a glass tube 30 cm long if.one end of the tube is closed and flat Velocity of sound in air = $360m/s$

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17. What is the fundamental frequency of vibration of an air column in a glass tube 30 cm long if. Both the ends of the tube are open? Velocity of sound in air = $360m/s$

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18. Velocity of sound in air at room temperature is $333m/s$. An air column is 33.3

cm. long. Find the frequency of its fifth overtone if it is closed at on end

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19. Velocity of sound in air is $333\frac{m}{s}$.Length of air column in pipe is $33.3cm$. Calculate the frequency of the 5th overtone , if the pipe is open at both the ends.

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20. Two open pipes of lengths 50 cm and 51 cm produce 6 beats per second when emitting their fundamental frequencies. Neglect end-corrections and calculate the velocity of sound.

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21. Beats are heard at the rate of 12 every 5 seconds when two open pipes of lengths 84

cm and 85 cm vibrate in the fundamental mode.Find the velocity of sound.

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22. The frequency of third overtone of a closed pipe is in unison with the fifth overtone of an open pipe .What is the ratio of their lengths ? (Neglect end correction)

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23. The frequency of third overtone of a closed pipe is in unison with the fifth overtone of an open pipe .What is the ratio of their lengths ? (Neglect end correction)

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24. Two sources of sound produce waves differing in wavelength by 12 cm. If the frequencies of the sound are 320 Hz and 360 Hz, calculate the velocity of sound in air.

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25. Calculate the velocity of sound in gas in which two waves of wavelengths 50 cm and 50.5 cm produce 6 beats per second.

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26. A sound wave of amplitude 0.2 m and frequency 500 Hz is travelling with a velocity $200m/s$. Calculate the displacement of a particle at a distance of 4 m after 3 s.

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27. Wavelengths of two sound waves in air are 81/174 m and 81/175 m. When these waves meet at a point simultaneously, they produce 4 beats per second. Calculate the velocity of sound in air.

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28. A set of 12 tuning forks is arranged in order of increasing frequencies. Each fork produces y beats persecond with previousone.The last is anoctave of the first. The fifth fork as frequency 90 Hz.Find y and the frequency of the first and lastfork

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29. A set of 11 tuning forks is kept in ascending order of frequencies. Each tuning fork gives 5

beats per second with the previous one. If the frequency of the last fork is 1.5 times that of the first , find the frequency of the first and last fork.

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30. A set of 31 tuning forks is arranged in series of decreasing frequencies. Each fork gives 6 beats per second with the proceeding one and frequency of the first fork is twice the

frequency of the last. Find the frequency of the first and the last tuning fork.

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31. When an air column in a pipe closed at one end vibrates such that three nodes are formed in it, the frequency of its vibrations is ..... Times the fundamental frequency.

A. 2

B. 3

C. 4

D. 5

Answer:

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32. If two open organ pipes of length 50 cm and 51 cm sounded together produce 7 beats per second , the speed of sound is

A. $307m/s$

B. $327m/s$

C. $350m/s$

D. $357m/s$

Answer:

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33. The tension in a piano wire is increased by 25% .Its frequency becomes ..... Times the original frequency .

A. 0.8

B. 1.12

C. 1.25

D. 1.56

Answer:

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34. Which of the following equations represents a wave travelling along the y - axis?

A. x = Asin (ky— wt)

B. y = Asin (ky -wt)

C. y = Asin (ky) cos(wt)

D. y=Acos(ky)sm(wt)

Answer:

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35. A standing wave is produced on a string fixed at one end with the other end free. The length of the string

A. $\mu stbeanodd\int egral\mu < ip \leq of\lambda/4.$

B. $\mu stbeanodd\int egral\mu < ip \leq of\lambda/2.$

C. $\mu stbeanodd\int egral\mu < ip \leq of\lambda$

D. $\mu stbeaneven\int egral\mu < ip \leq of\lambda$

Answer:

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36. The frequency of the third overtone of a closed pipe of length Lc is the same as the

frequency of the sixth overtone of an open pipe of the length L_o. Then:

A. $(l_o / l_c) = 1/2$

B. $(l_o / l_c) = 2$

C. $(l_o / l_c) = 1/4$

D. $(l_o / l_c) = 4$

Answer:

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37. A tuning fork produces $4beats/\sec$, with a sonometer wire of length 40 cm. It is found that when the length is increased to 44 cm, by keeping other factors constant, again $4beat/\sec$ are produced. What isthe frequency of the tuning fork?

A. 44Hz

B. 100Hz

C. 84Hz

D. 176Hz

Answer:

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38. A sonometer wire of length L_1 vibrates with a frequency 250 Hz. If the length of wire is in creased then 2 beats per second are heard. What is ration of the lengths of the wire?

A. 250:313

B. 0.21041666666667

C. 124:125

D. 41:57

Answer:

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39. A uniform wire of length 20 m and weighing 5 kg hangs vertically. The speed of transverse wave in the middle of the wire is $(g = 10m/s^2)$

A. $10.14m/s$

B. $14.14m/s$

C. $24m/s$

D. $zerom/s$

Answer:

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40. The velocity of sound in air at room temperature is $350\frac{m}{s}$.Find the frequency of second overtone of air column of length 70 cm

when it is

open at both ends.

A. 750 Hz

B. 100 Hz

C. 125 Hz

D. 75 Hz

Answer:

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41. For a stationary wave $y = 4\sin(\pi x/15)\cos(96\pi t)$. This distance between a node and the next antinode is:

A. 22.5 cm

B. 30 cm

C. 7.5 cm

D. 15 cm

Answer:

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42. A sonometer wire resonates with a tuning fork. It itslength isincreased by 5%,10 beats are produced per second. The frequency of the tuning fork is.

A. 200 Hz

B. 205 Hz

C. 210 Hz

D. 215 Hz

Answer:

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43. Standing waves are produced in10m long stretched string. If the string vibrates in 5 segments and wave velocity is $20m/s$, then its frequency will be:

A. 5 Hz

B. 12 Hz

C. 10 Hz

D. 2 Hz

Answer:

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44. Two closed organ pipes, when sounded simultaneously gave 4 beats persecond. If longer tube has a length1m, then the length of the shorter tube will be $(v = 330m/s)$:

A. 108.8 cm

B. 95.4 cm

C. 97 cm

D. 104 cm

Answer:

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45. For a certain organ pipe, thre successive harmonics are 425 Hz, 595 Hz, 765 Hz respectively. What is the fundamental frequency?

A. 170 Hz

B. 125 Hz

C. 85 Hz

D. 105 Hz

Answer:

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46. A string when stretched by a weight of 4 kg wt. gives a note of frequency 256 Hz. If the tension is increased to 16 kg wt., the frequency of note produced will be:

A. 384 Hz

B. 128 Hz

C. 256 Hz

D. 512 Hz

Answer:

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47. For an open metal pipe of length L the wavelength of the first overtone is given by

A. L/2

B. L

C. 2L

D. 4L

Answer:

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48. Two tuning forks produce $5 beats / \sec$ when sounded together. They can be brought in unison with length of 88 cm and 90 cm

respectively of a sonometer wire under ension.The frequencies of the forks are

A. 440 and 445 Hz

B. 110 and 115 Hz

C. 220 and 225 Hz

D. 225 and 230 Hz

Answer:

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49. For an closed metal pipe of length L the wavelength of the first overtone is given by

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

B. 4L

C. 2 L

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

Answer:

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50. An open organ pipe of length l and diameter d. If velocity of air is V then, The fundamental frequency of the pipe is

A. v/(2l-0.6d)

B. (2l-1.2d)/v

C. v/(2l-1.2d)

D. v/(l-0.6d)

Answer:

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51. The velocity of sound in air at room temperature is $350\frac{m}{s}$.Find the frequency of second overtone of air column of length 70 cm when it is

closed at one end.

A. 575 Hz

B. 125 Hz

C. 625 Hz

D. 450 Hz

Answer:

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52. The phase difference between the particles in successive loops of stationary wave is

A. π

B. 2π

C. $\pi/2$

D. $\pi/4$

A. π

B. 2π

C. $\pi/2$

D. $\pi / 4$

Answer:

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53. Acord stretched to a vibrating fork is divided into 6 loops when its tension is 36 N. The tension at which it will vibrate with 4 loops is.

A. 18 N

B. 54 N

C. 64 N

D. 81 N

A. 18 N

B. 54 N

C. 64 N

D. 81 N

Answer:

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54. The third overtone of a closed organ pipe is found to be in unison with first overtone an open pipe. The ratio of the length of the pipe is:

A. $\frac{7}{4}$

B. $\frac{4}{7}$

C. $\frac{1}{7}$

D. $\frac{7}{1}$

A. $\frac{7}{4}$

B. $\frac{4}{7}$

C. $\frac{1}{7}$

D. $\frac{7}{1}$

Answer:

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55. A tube closed at one end containing air produces fundamental note of frequency 512 Hz. If the tube is opened at both the ends, the fundamental note will be:

A. 1280 Hz

B. 256 Hz

C. 1024 Hz

D. 2048 Hz

Answer:

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56. The equation of a progressive wave traveling on a stretched string is $y = 10 \sin 2\pi\left(\left(\frac{t}{0.02}\right) - \left(\frac{x}{100}\right)\right)$ where x and y

arein cm and t is in sec. What is the speed of the waves?

A. $500cm / s$

B. $50cm / s$

C. $5000cm / s$

D. $50cm / s$

Answer:

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57. Two sound wave of wavelength 0.80 m and 0.81 m produce 8 beats per second in air. The frequency of the two waves are respectively:

A. 324 Hz and 316 Hz

B. 173Hz and 165 Hz

C. 320 Hz and 312 Hz

D. 648 Hz to 640 Hz

Answer:

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58. A progressive wave of frequency 570 Hz is travelling with velocity of $360m/s$. How far apart are two points 60° out of phase?

A. 0.12 m

B. 0.06 m

C. 2.4 m

D. 0.11m

Answer:

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59. A set of 56 tuning forks are so arranged in series that each fork given 4 beats per second with previous one.The frequency of last fork 1.5 times that of the first. The frequency f 50th fork is:

A. 220 Hz

B. 440 Hz

C. 636 Hz

D. 660 Hz

Answer:

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60. Two tuning forks of frequencies 256 Hz and 258 Hz are sounded together. Then the timesinterval between two consecutive maxima and minima heard by an observer is

A. 2 second

B. 1 second

C. 0.5 second

D. 0.25 second

Answer:

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61. When the transverse wave reflects normally from the denser medium there will be phase change of

A. 0°

B. 180°

C. 90°

D. 360°

Answer:

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62. Loudness of a note of sound is:

A. Directly proportional to the amplitude of wave

B. Directly proportional to the squareamplitude of wave

C. Inversely proportional to the square root of amplitude of wave

D. Inversely proportional to the amplitude of wave.

Answer:

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63. A sound wave y=$A_0 \sin(\omega t - kx)$ is reflected from a rigid wall with 64% of its

ampltitude. The equation of the reflected wave is

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

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

C. π

D. 2π

Answer:

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

A. 3A

B. $\sqrt{5}A$

C. $\sqrt{2}A$

D. A

Answer:

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65. The intensity of two waves is $1:16$. The ratio of their amplitude is

A. $1:16$

B. $1:4$

C. $4:1$

D. $2:1$

Answer:

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66. The frequency of the open organ pipe is

A. $v/(2l+1.2d)$

B. $2/(-1.2d/v)$

C. $(2l-1.2d)/v$

D. $v/(2l-1.2d)$

Answer:

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67. The velocity of sound in air at room temperature is $350\frac{m}{s}$.Find the frequency of second overtone of air column of length 70 cm when it is

open at both ends.

A. 575 Hz

B. 125 Hz

C. 625 Hz

D. 450 Hz

Answer:

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68. The phase difference between the particles in successive loops of stationary wave is

A. π

B. 2π

C. $\pi/2$

D. $\pi/4$

A. π

B. 2π

C. $\pi/2$

D. $\pi / 4$

Answer:

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69. Loudness of a note of sound is:

A. Directly proportional to the amplitude of wave

B. Directly proportional to the amplitude of wave

C. Inversely proportional to the square root of amplitude of wave

D. Inversely proportional to the amplitude of wave.

Answer:

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70. A wave is represented by an equation $y = A\sin(Bx + Ct)$. Given that the

constants A, B and C are positive , can you tell in which direction the wave is moving ?

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71. Define Loudness

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72. Find the velocity of a transverse wave along a string of linear density

$3.6X10^{-3}kg/m$ when it is under a tension of $1.8kg-wt.\ g=9.8\frac{m}{s^2}$

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73. State the characterstic of stationary waves.

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74. Explain reflection of transverse wave whena wave pulse travels from a rarer to a denser medium.

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75. What will be intensities of the waves whenthe waves interfere . In phase and

Watch Video Solution

76. What will be intensities of the waves whenthe waves interfere . Out of phase.

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77. State causes and and limitations of end correction.

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78. A sound wave in a certain fluid medium is reflected at an obstacle to form a standing wave. The distance between two successive nodes is 3.75 cm. If the velocity of sound is $500 m / s$. find the frequency.

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79. A string $105cm$ long is fixed at one end. The other end of string is moved up and down with frequency $15Hz$.A stationary wave, produced in the string , consists of 3 loops. Calculate the speed of progressive waves which have produced the stationary wave in the string.

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80. The displacement of two sinusoidal waves propagating through a string are given by the following equation $y_1 = 4\sin(20x - 30t)$, $y_2 = 4\sin(25x - 40t)$.where x and y are in centimeter and t in second

Calculate the phase difference between these two waves at the points $x = 5cm$ and $t = 2s$.

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81. The displacement of two sinusoidal waves propagating through a string are given by the following equation $y_1 = 4\sin(20x - 30t)$, $y_2 = 4\sin(25x - 40t)$.where x and y are in centimeter and t in second

When these two waves interfere , what are the maximum and minimum values of the intensity ?

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82. Find the amplitude of the resultant wave produced due to interference of two wavesand what will be resultant amplitude when thewaves are. in phase and

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83. Find the amplitude of the resultant waveproduced due to interference of two wavesand what will be resultant amplitude when thewaves are. Out of phase.

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84. Explain production of beats and deduce analytically the expression for beat frequency.

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85. Show that the fundamental frequency of vibrations of the air column in a tube open at both is equal to double the fundamental frequency in a tube of the same length and closed at one end.

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86. Show that even as well as odd (all) harmonics are present as overtones in the case of an air column vibrating in a pipe open at both ends.

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