NEET PHYSICS 2018-19 - Chennai

Periodic Test : 12 **Test ID :** 024

Number of questions: 150 **Test date: 01.04.2019**

Name: _____ **Time**: 3HRS

ID No: _____

Negative Marks : 4 marks for correct attempt & 1 mark deducted for every wrong attempt.

1. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?
(a) 20 Hz
(b) 30 Hz
(c) 40 Hz
(d) 10 Hz

2. Two cars moving in opposite directions approach each other with speed of 22 ms^{-1} and 16.5 ms^{-1} respectively. The driver of the first car blows a horn having a frequency 400 Hz. The frequency heard by the driver of the second car is (velocity of sound is 340 m s^{-1})
(a) 361 Hz
(b) 411 Hz AI
(c) 448 Hz
(d) 350 Hz

3. The second overtone of an open organ pipe has the same frequency as the first overtone of a closed pipe L metre long. The length of the open pipe will be
(a) L
(b) 2L
(c) L/2
(d) 4L

4. Three sound waves of equal amplitudes have frequencies (n- 1), n, (n + 1). They superimpose to give beats. The number of beats produced per second will-be
(a) 1
(b) 4
(c) 3
(d) 2

5. A siren emitting a sound of frequency 800 Hz moves away from an observer towards a cliff at a speed of 15 m s^{-1}. Then, the frequency of sound that the observer hears in the echo reflected from the cliff is (Take velocity of sound in air = 330 m s^{-1})
(a) 838 Hz
(b) 885 Hz
(c) 765 Hz
(d) 800 Hz

6. An air column, closed at one end and open at the other, resonates with a tuning fork when the smallest length of the column is 50 cm. The next larger length of the column resonating with the same tuning fork
(a) 150 cm
(b) 200 cm
(c) 66.7a
(d) 100 cm

7. A uniform rope of length L and mass m_1 hangs vertically m 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 λ_2/λ_1 is

(a) $\sqrt{m2/m1}$

(b) $\sqrt{\frac{m1+m2}{m1}}$

(c) $\sqrt{m1/m2}$

(d) $\sqrt{\frac{m1+m2}{m2}}$

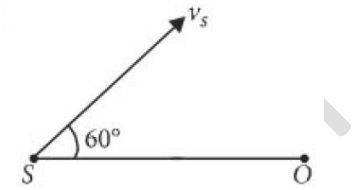
8. A string is stretched between fixed points separated by 75.0 cm, It is observed to have resonant frequencies of 420 Hz and 315 Hz There are no other resonant frequencies between these two. The lowest resonant frequency for this string is

(a) 10.5 Hz
(b) 105 Hz
(c) 155 Hz
(d) 205 Hz

9. 4.0 g of a gas occupies 22.4 litres at NTP. The specific heat capacity of the gas at constant volume is 5.0 J $K^{-1}mo1^{-1}$. If the speed of sound in this gas at NTP is 952 m s^{-1}, then the heat capacity at constant pressure is (Take gas constant R = 8.3 J K^{-1} $mo1^{-1}$)

(a) 7.0 J $K^{-1}mo1^{-1}$
(b) 8.5 J $K^{-1}mo1^{-1}$
(c) 8.0 J $K^{-1}mo1^{-1}$
(d) 7.5 J $K^{-1}mo1^{-1}$

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



(a) 106 Hz
(b) 97 Hz
(c) 100 Hz
(d) 103 Hz

11. The fundamental frequency of a closed organ pipe of length 20 cm 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) 120 cm
(b) 140 cm
(c) 80 cm
(d) 100 c

12. If n_1, n_2 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) $\frac{1}{n} = \frac{1}{n1} + \frac{1}{n2} + \frac{1}{n3}$
(b) $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n1}} + \frac{1}{\sqrt{n2}} + \frac{1}{\sqrt{n3}}$
(c) $\sqrt{n} = \sqrt{n1} + \sqrt{n2} + \sqrt{n3}$
(d) n = n1+n2+n3

13. The number of possible natural oscillations of air column in a pipe closed at one end of length 85 cm whose frequencies lie below 1250 Hz are (Velocity of sound = 340 m s^{-1})
(a) 4
(b) 5
(c) 7
(d) 6

14. A speeding motorcyclist sees traffic jam ahead him. He slows down to 36 km $hour^{-1}$. He finds that traffic has eased and a car moving ahead of him at 18 km $hour^{-1}$ is honking at a frequency of 1392 Hz If the speed of sound is 343 m s^{-1}, the frequency of the honk as heard by him will be
(a) 1332 Hz
(b) 1372 Hz
(c) 1412 Hz
(d) 1454 Hz

15. If we study the vibration of a pipe open at both ends, then the following statement is not true.
(a) All harmonics of the fundamental frequency will be generated.
(b) Pressure change will be maximum at both ends.
(c) Open end will be antinode.
(d) Odd harmonics of the fundamental frequency will be generated.

16. A wave travelling in the +ve x-direction having displacement along y-direction as 1 m, wavelength 2π m and frequency of 1/π Hz is It represented by
(a) y = sin(10πx — 20πt)
(b) y = sin(2π x + 2πt).
(c) = sin(x -2t)
(d) y = sin(2π x+ 2π t)

17. 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 Hz, The unknown frequency is
(a) 240 Hz
(b) 260 Hz
(c) 254 Hz
(d) 246 Hz

18. The length of the wire between two ends of a sonometer is 100 cm. What should be the positions of two bridges below the wire so that the three segments of the wire have their fundamental frequencies in the ratio 1 : 3 : 5.
(a) $\frac{1500}{23} cm, \frac{500}{23} cm$
(b) $\frac{1500}{23} cm, \frac{300}{23} cm$
(c) $\frac{300}{23} cm, \frac{1500}{23} cm$
(d) $\frac{1500}{23} cm, \frac{2000}{23} cm$

19. Two sources P and Q produce notes of frequency 660 Hz each. A listener moves from P to Q with a speed of 1 ms^{-1}. If the speed of sound is 330 m/s, then the number of beats heard by the listener per second will be
(a) 4
(b) 8
(c) 2
(d) zero

20. When a string is divided into three segments of length l1,l2, and l3 the fundamental frequencies of these three segments are ν_1,ν_2 and ν_3 respectively. The original fundamental frequency (u) of the string is

(a) $\sqrt{v} = \sqrt{v1} + \sqrt{v2} + \sqrt{v3}$

(b) ν=ν1+ν2+ν3

(c) $\frac{1}{v} = \frac{1}{v1} + \frac{1}{v2} + \frac{1}{v3}$

(d) $\frac{1}{\sqrt{v}} = \frac{1}{\sqrt{v1}} + \frac{1}{\sqrt{v2}} + \frac{1}{\sqrt{v3}}$

21. Two sources of sound placed close to each other, are emitting progressive waves given by y_1= 4sin600πt and y_2 = 5sin608πt

An observer located near these two sources of sound will hear

(a) 4 beats per second with intensity ratio 25 : 16 between waxing and waning.

(b) 8 beats per second with intensity ratio 25 : 16 between waxing and waning.

(c) 8 beats per second with intensity ratio 81 : 1 between waxing and waning.

(d) 4 beats per second with intensity 4 81 : 1 between waxing and waning.

22. The equation of a simple harmomic given by y = 3 sin-$\frac{\pi}{2}$(50t - x),

where x and y are in metres and t is in seconds. The ratio of maximum particle velocity to the wave

(a) 2π

(b) $\frac{3}{2}\pi$

(c) 3π

(d) $\frac{2}{3}\pi$

23. A train moving at a speed of 220 m s^{-1} towards a station object, emits a sound of frequency 1000 Hz. Some of the sound reaching the object gets reflected back to the train as echo. The frequency of the echo as detected by the driver of the train is (Speed of sound in air is 330 m s^{-1})

(a) 3500 Hz

(b) 4000 Hz

(c) 5000 Hz

(d) 3000 Hz

24. Two waves are represented by the equations

y_1 = αsin(ωt + kx + 0.57) m and

y_2 = αcos(ωt + kx) m, where x is in meter and t in sec. The phase difference between them is

(a) 1.0 radian

(b) 1.25 radian

(c) 1.57 radian

(d) 0.57 radian

25. Sound waves travel at 350 m/s through a warm air and at 3500 m/s through brass. The wavelength of a 700 Hz acoustic wave as it enters brass from warm air

(a) decrease by a factor 10

(b) increase by a factor 20

(c) increase by a factor 10

(d) decrease by a factor 20

26. Standing waves are produced in 10 m long stretched string. If the string vibrates in 5 segments and wave velocity is 20 m/s, the frequency is

(a) 5 Hz

(b) 10 Hz

(c) 2 Hz

(d) 4 Hz

27. A cylindrical tube, open at both ends has fundamental frequency *f* in air. The tube is dipped vertically in water, so that half of it is in water. The fundamental frequency of air column is now
(a) *f* /2
(b) 3 *f* /4
(c) 2 *f*
(d) *f*

28. The equation of a sound wave is y = 0.0015 sin (62.4x + 316t). The wavelength of this wave is
(a) 0.3 unit
(b) 0.2 unit
(c) 0.1 unit
(d) cannot be calculated.

29. Two sound waves having a phase difference of 60° have path difference of
(a) $\frac{\lambda}{6}$
(b) $\frac{\lambda}{3}$
(c) 2λ
(d) $\frac{\lambda}{2}$

30. The length of a sonometer wire AB is 110 cm. Where should the two bridges be placed from A to divide the wire in 3 segments whose fundamental frequencies are in the ratio of 1:2:3?
(a) 60 cm and 90 cm
(b) 30 cm and 60 cm
(c) 30 cm and 90 cm
(d) 40 cm and 80 cm.

31. A hospital uses an ultrasonic scanner to locate tumours in a tissue. The operating frequency of the scanner is 4.2 MHz. The speed of sound in a tissue is 1.7 km/s. The wavelength of sound in the tissue is close to
(a) 4 X 10^{-3} m
(b) 8 X 10^{-3} m
(c) 4 X 10^{-4} m
(d)4 X 10^{-4} m

32. A source of sound gives 5 beats per second, when sounded with another source of frequency 100 $second^{-1}$. The second harmonic of the source, together with a source of frequency 205 sec^{-1} gives 5 beats per second. What is the frequency of the source?
(a) 105 $second^{-1}$
(b) 205 $second^{-1}$
(c) 95 $second^{-1}$
(d) 100 $second^{-1}$

33. A star, which is emitting radiation at a wavelength of 5000 Å, is approaching the earth with a velocity of 1.5 x10^4m/s. The change in wavelength of the radiation as received on the earth is
(a) 25 Å
(b) 100 Å
(c) zero
(d) 2.5 Å

34. Which one of the following represents a wave?
(a) y = A sin (ωt -kx)
(b) y = A cos (at - bx + c)
(c) y= A sin kx
(d) y= A sin ωt

35. A wave of frequency 100 Hz travels along a string towards its fixed end. When this wave travels back, after reflection, a node is formed at a distance of 10 cm from the fixed end. The speed of the wave (incident and reflected) is
(a) 20 m/s
(b) 40 m/s
(c) 5 m/s.
(d) 10 m/s.

36. A stationary wave is represented by $y = A \sin(100t) \cos(0.01x)$, where y and A are in millimetres, t is in seconds and x is in metres. The velocity of the wave is
(a) 10^4 m/s
(b) not derivable
(c) 1 m/s
(d) 10^2 m/s.

37. A source of frequency ν gives 5 beats/second when sounded with a source of frequency 200 Hz. The second harmonic of frequency 2ν of source gives 10 beats/second when sounded with a source of frequency 420 Hz. The value of ν is
(a) 205 Hz
(b) 195 Hz
(c) 200 Hz
(d) 210 Hz.

38. Wave has simple harmonic motion whose period is 4 seconds while another wave which also possesses simple harmonic motion has its period 3 second If both are combined, then the resultant wave will have the period equal to
(a) 4 s
(b) 5 s
(c) 12 s
(d) 3 s

39. A stretched string resonates with tuning fork frequency 512 Hz when length of the string is 0.5 m. The length of the string required to vibrate resonantly with a tuning fork of frequency 256 Hz would be
(a) 0.25 m
(b) 0.5 m
(c) 1 m
(d) 2 m

40. The temperature at which the speed of sound becomes double as was at 27°C is
(a) 273°C
(b) 0°C
(c) 927°C
(d) 1027°C

41. For production of beats the two sources must have
(a) different frequencies and same amplitude
(b) different frequencies
(c) different frequencies, same amplitude and same phase
(d) different frequencies and same phase

42. The frequency of sinusodial wave $y = 0.40\cos [2000 t + 0.80]$ would be
(a) 1000π Hz
(b) 2000 Hz
(c) 20 Hz
(d) 1000/π Hz

43. With the propogation of a longitudinal wave through a material medium, the quantities transmitted in the propogation direction are
(a) energy, momentum and mass
(b) energy
(c) energy and mass
(d) energy and linear momentum

44. Two trains move towards each other with the same speed. The speed of sound is 340 m/s. If the height of the tone of the whistle one of them heard on the other changes to 9/8 times, then the speed of each train should be
(a) 20 m/s
(b) 2 m/s
(c) 200 m/s
(d) 2000 m/s

45. A closed organ pipe (closed at one end) is excited to support the third overtone. It is found that air in the pipe has
(a) Three nodes and three antinodes
(b) Three nodes and four antinodes
(c) Four nodes and three antinodes
(d) Four nodes and four antinodes

46. Velocity of sound waves in air is 330 m/s. For a particular sound wave in air, a path difference of 40 cm is equivalent to phase difference of 1.6 π. The frequency of this wave is
(a) 165 Hz
(b) 150 Hz
(c) 660 Hz
(d) 330 Hz

47. A 5.5 metre length of string has a mass of 0.035 kg. If the tension in the string in 77 N, the speed of a wave on the string is
(a) 110 m s^{-1}
(b) 165 m s^{-1}
(c) 77 m s^{-1}
(d) 102 m s^{-1}

48. If the amplitude of sound is doubled and the frequency reduced to one fourth, the intensity of sound at the same point will be
(a) increasing by a factor of 2
(b) decreasing by a factor of 2
(c) decreasing by a factor of 4
(d) unchanged

49. The velocity of sound in any gas depends upon
(a) wavelength of sound only
(b) density and elasticity of gas
(c) intensity of sound waves only
(d) amplitude and frequency of sound

50. Equation of progressive wave is given by $y = 4\sin\left[\pi\left(\frac{t}{5} - \frac{x}{9}\right) + \frac{\pi}{6}\right]$ where y, x are in cm and t in seconds. Then which of the following is correct?
(a) ν = 5 cm
(b) λ = 18 cm
(c) α = 0.04 cm
(d) f = 50 Hz