THESE WORKSHEET ARE DESIGNED TO HELP STUDENT IN THEIR PREPRATION BY PROVIDING THEM BEST AND AUTHENTIC PRACTICE SHEET FOR THEIR PRACTICE, BECAUSE MANY STUDENTS ARE SO MUCH CONFUSED FOR THEIR PRACTICE AS PER PMC SYLLABUS: -

THESE MCQS ARE TAKEN FROM RECENT TESTS OF KIPS, STEP STAR, GRIP, SPSC AND MANY OTHER ACADEMIES OF PAKISTAN

I AM COMPILLING WORKSHEETS OF ALL CHAPTERS OF ALL SUBJECTS

TILL NOW THESE WORKSHEET HAS BEEN COMPLETED

1. BIOLOGICAL MOLECULES AND EZNYMES 610 MCQS
2. CELL STRUCTURE AND FUNCATION 600 MCQS
3. BIOENERGETICS 425 MCQS
4. FORCE AND MOTION 310 MCQS
5. WAVES 300 MCQS
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JULY 2, 2021

SKN

PHYSICS NMDCAT
TOPIC WISE TEST (UNIT–4)

TOPIC:
- ✓ **Waves**

Q.1 The speed of sound waves having a frequency of 256 Hz, compared with the speed of sound waves having a frequency of 512Hz is

A. Half as great   B. Four times as great

C. Twice as great   D. Same

Q.2 Speed of sound in a gas is proportional to

A. Square root of isothermal elasticity   B. Isothermal elasticity

C. Square root of adiabatic elasticity   D. Adiabatic elasticity

Q.3 With the propagation of a longitudinal wave through a material medium, the quantities transferred in the direction of propagation are

A. Energy, momentum and mass   B. Energy and mass

C. Energy and momentum   D. Energy

Q.4 When a wave goes from one medium to another, there is a change in the

A. Velocity   B. Frequency

C. Wavelength   D. Both "A" and "B"

Q.5 How does the speed v of sound in air depend on the atmospheric pressure P?

A. $v \propto P^{-1}$ B. $v \propto P^{1/2}$

C. $v \propto P^{2}$ D. $v \propto P^{0}$

Q.6 At what temperature the speed of sound in air will be 1.5 times its value at 27°C in air?

A. 102°C   B. 204°C

C. 204°C   D. 402°C

Q.7 When sound waves enter from air into water, then

A. λ increases   B. Frequency increases

C. Speed decreases   D. All of them

Q.8 The velocity of sound is v_s in air. If density of air is increased twice then the new velocity of sound will be

A. v_s B. $\sqrt{2}v_s$

C. $\dfrac{v_s}{\sqrt{2}}$ D. $\dfrac{3}{2}v_s$

Q.9 An ultrasonic scanner is used in a hospital to detect tumour in tissue. The working frequency of the scanner is 4.2 mega Hz. The velocity of sound in the tissue is 2.1 kms^{-1}. The wavelength of sound in the tissue is nearest to

A. 4×10^{-3} m   B. 5×10^{-4} m

C. 8×10^{-3} m   D. 8×10^{-4} m

**Q.10** The percentage error in Newton's formula for the speed of sound in air is

A. 15%   B. 20%

C. 16%   D. 10%

Q.11 When a source of sound is in motion towards a stationary observer, the effect observed is

A. Increase in the velocity of sound only

B. Increase in frequency of sound only

C. Decrease in the velocity of sound only

D. Increase in both the velocity and the frequency of sound

Q.12 The velocity of sound is generally greater is solids than in gases because

A. The density of solids is high and the elasticity is low

B. The density of solids is low and the elasticity is high

C. Both the density and the elasticity of solids are very low

D. The elasticity of solids is very high

Q.13 In sound waves during the compressions

A. density of medium is maximum

B. density of the medium is minimum

C. pressure of medium is maximum

D. both 'A' and 'B'

Q.14 The isothermal elasticity of a medium is E_i and the adiabatic elasticity is E_a. The velocity of the sound in the medium is proportional to

A. $\sqrt{E_i}$

B. $\sqrt{E_a}$

C. E_a

D. E_i

Q.15 A particular wavelength received from a galaxy is measured on earth and is found to be 5% more then that its' wave length. Hence galaxy is

A. Moving towards earth

B. stationary with respect to earth

C. Going away from earth

D. none of these

Q.16 Which of the following has maximum audible frequency range?

A. Dolphin

B. Cat

C. Bat

D. Dog

Q.17 Doppler Effect is used to monitor blood flow through major arteries by ultrasound waves of frequency.

A. 5 Hz to 10 Hz

B. 5 KHz to 10 KHz

C. 5 MHz to 10 MHz

D. 5 GHz to 10 GHz

Q.18 RADAR operates on the principle of

A. beats

B. Doppler's Effect

C. interference

D. Compton's Effect

Q.19 Newton's formula for the speed of sound in fluids is

A. $v = \sqrt{\dfrac{P}{\rho}}$

B. $v = \sqrt{\dfrac{\rho}{E}}$

C. $v = \sqrt{\dfrac{E}{\eta}}$

D. $v = \sqrt{\dfrac{\gamma P}{\rho}}$

Q.20 The speed of sound in vacuum at 10°C is

A. 338.2 ms^{-1}

B. 332 ms^{-1}

C. 340 ms^{-1}

D. 0 ms^{-1}

Q.21 Which one of the following graphs shows constructive interference?

A.

B.

C.

D.
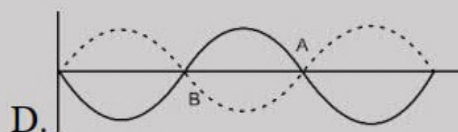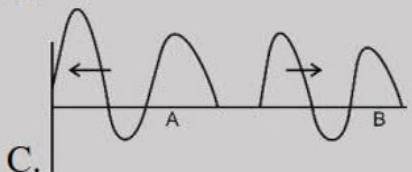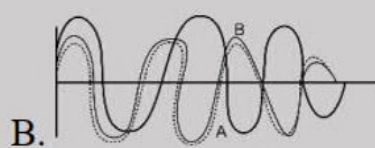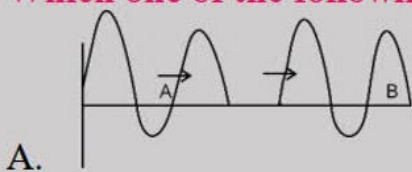
Q.22 With rise in temperature, the speed of sound in a gas
A. Increases
B. Decreases
C. Remains same
D. May increase or decrease depending upon air pressure

Q.23 The value of γ for diatomic gas is
A. 1.40   B. 1.29
C. 1.67   D. 1.47

Q.24 Which of the following has maximum value of $\gamma = \dfrac{C_p}{C_v}$

A. Monoatomic gas   B. Polyatomic gas
C. Diatomic gas   D. All have same value

Q.25 The displacement of particle in S.H.M. in one-time period, if its amplitude of its motion is "A" will be
A. Zero   B. 2A
C. A   D. 4A

Q.26 Which of the following is mechanical wave?
A. Light waves   B. X-rays
C. Sound waves   D. Radio waves

Q.27 Sound travels faster in moist air at STP because
A. Moist air is heavier than dry air
B. The pressure of moist air is greater than that of dry air
C. The value of γ of moist air is greater than that for dry air
D. The density of moist air is less than that of dry air

Q.28 The product of angular frequency (ω) and time period T will be
A. 1   B. 2π
C. $\dfrac{\pi}{2}$ D. π

Q.29 On decreasing the temperature, the frequency of an organ pipe becomes
A. Decrease   B. Equal
C. Increase   D. Infinity

Q.30 In a stationary wave the distance between consecutive antinodes is 25 cm. If the wave velocity is 300 ms^{-1}, then the frequency of wave will be
A. 150 Hz   B. 600 Hz
C. 300 Hz   D. 750 Hz

Q.31 A sitar wire vibrates with frequency of 330 vibrations per second. If its length is increased three times and tension is increased four times, then the frequency of the wire will be
A. 110 Hz   B. 330 Hz
C. 220 Hz   D. 440 Hz

Q.32 The length of a string is 1m, tension in it is 40N and mass of the string is 0.1 kg. Then the velocity of transverse waves produced in the string will be:

A. 400 ms^{-1} B. 80 ms^{-1}

C. 180 ms^{-1} D. 20 ms^{-1}

Q.33 A tube closed at one end and containing air produce fundamental note of frequency of 256 Hz. If the tube is open at both ends, the fundamental frequency will be:

A. 512 Hz   B. 128 Hz

C. 384 Hz   D. 64 Hz

Q.34 Which of the following laws of strings is not correct? Where "n" is frequency of string.

A. $n \propto \dfrac{1}{\sqrt{m}}$ B. $n \propto \sqrt{T}$

C. $n \propto \ell$ D. $n \propto \dfrac{1}{\ell}$

Q.35 When both source and listener move in the same direction with a velocity equal to half the velocity of sound, the change in frequency of the sound as detected by the listener is:

A. 50%   B. Zero

C. 25%   D. None of these

Q.36 The wavelength of the produced by a source is 0.8m. If the source moves towards the stationary listener at 32 ms^{-1}, what will be apparent wavelength of the sound? The velocity of sound is 320 ms^{-1}.

A. 0.80 m   B. 0.40 m

C. 0.72 m   D. 0.32 m

Q.37 The velocity of sound in air is 332 ms^{-1}. The length of a closed pipe whose frequency of second overtone is 332 Hz, will be:

A. 0.51 m   B. 1.25 m

C. 0.75 m   D. 1.75 m

Q.38 The velocity of sound in air is 330 ms^{-1}. The fundamental frequency of an organ pipe open at both ends and length 0.3 m will be.

A. 200 Hz   B. 300 Hz

C. 275 Hz   D. 550 Hz

Q.39 A source of sound of frequency 500 Hz is moving towards on observer with velocity 30 ms^{-1}. The speed of sound is 330 ms^{-1}. The frequency heard by observer will be:

A. 550 Hz   B. 530 Hz

C. 458.3 Hz   D. 454.5 Hz

Q.40 If a stretched-string is 4m and it has 4 loops of stationary waves, then wave length is

A. 1m   B. 2m

C. 3m   D. 4m

Q.41 If a string vibrates in "n" loops, the wavelength of stationary wave will be:

A. $\dfrac{2\ell}{n}$ B. $\dfrac{n\ell}{2}$

C. $\dfrac{2n}{\ell}$ D. $\dfrac{\ell}{2n}$

Q.42 In resonance tube, which of the followings is formed at open end

A. node   B. antinodes

C. neither a nor b   D. either a or b

Q.43 A tight wire is clamped at two points 2 m apart. It is plucked near one end, what are the three longest wavelengths produced on the vibrating wire:

A. 2 m, 1 m, 0.67 m   B. 4 m, 2 m, 1.33 m

C. 4 m, 2 m, 1 m   D. 1 m, 0.5 m, 0.33 m

Q.44 The frequency of the fundamental mode of transverse vibration of a stretched wire 1000 *mm* long is 250 Hz. When the wire is shortened to 500 *mm* at the same tension, what is the fundamental frequency?

A. 125 Hz

B. 250 Hz

C. 500 Hz

D. 1000 Hz

Q.45 If the speed of sound on a cold day is v_c and its speed on hot day is v_a then

A. $v_c = v_a$

B. $v_c < v_a$

C. $v_c > v_a$

D. v_c may be more or less than v_a

Q.46 A stretched string resonates with fundamental frequency of 50 Hz. The wavelength for its 3rd overtone is if speed of transverse wave in the string is 100 ms^{-1}

A. 66 cm

B. 33 cm

C. 50 cm

D. 100 cm

Q.47 Distance and displacement traveled by a vibrating body in a time equal to $\frac{3}{4}T$; where T is the period of the vibration

A. $3x_o, 3x_o$

B. $3x_o, 0$

C. $3x_o, x_o$

D. $2x_o, 0$

Q.48 The chasing car 'B' traveling at 20 ms^{-1} sounds a horn which the driver of leading car A travelling at 16 ms^{-1} estimates has frequency 340 Hz. The frequency which B's own drive hears (v = 340 ms^{-1})

A. 332 Hz

B. 336 Hz

C. 334 Hz

D. 338 Hz

Q.49 The ratio of 2nd overtone to 3rd overtone in stationary wave produced in an air column open at both ends is

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

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

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

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

Q.50 In one end close pipe system of length 50 cm then wavelength for 3rd mode of vibration when stationary wave is formed.

A. 66.6 cm

B. 40 cm

C. 20 cm

D. 33.3 cm

Q.51 On the surface of moon as explosion takes, one from the surface of earth can

A) Hear and see the explosion

B) Only see the explosion

C) Only hear the explosion

D) Neither hear and nor see explosion

Q.52 What us phase difference between two points on a wave where the path difference is "$\frac{5\lambda}{2}$"?

A) 5π

B) 10π

C) 15π

D) 20π

Q.53 Wave id a disturbance that transports:

A) energy

B) Momentum

C) Mass

D) Both A and B

Q.54 Transverse waves can not be generated in:

A) Liquids

B) Solids

C) Gases
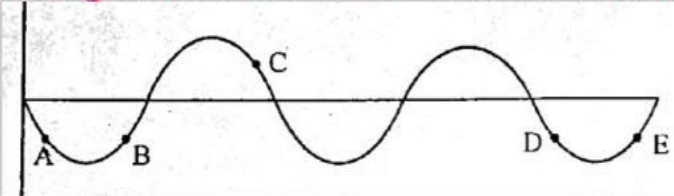
D) Both A and C

Q.55 Speed of sound in vacuum is:

A) 330ms $^{-1}$ B) 0 m s^{-1}
C) 332 ms^{-1} D) None of these

Q.56 The diagram shows a wave. which of the following pair of points in phase?

A) A, B   B) B, D
C) B, C   D) B. E

Q.57 Speed of sound in hydrogen is _____ with respect to oxygen
A) 2 times   B) 1/4 times
C) 4 times   D) 1/2 times

Q.58 The speed of a wave in medium is 760 m s^{-1}. If 3600 waves pass through a point in that medium in minutes, its wavelength is:
A) 13.8 m   B) 41.5 m
C) 25.3 m   D) 57.2 m

Q.59 For 1°C rise temperature speed of sound is increased by:
A) 61 cm s^{-1} B) 6.1 m s^{-1}
C). 61 m s^{-1} D) Both A and C

Q.60 If atmospheric pressure is doubled then speed of sound in air will:
A) Increase   B) Remain same
C) Decreases   D) May increase or decrease

Q.61 For Constructive interference of the sound waves the phase difference between waves can
A) π B) 3 π
C) 5 π D) 0

Q.62 Ratio of isothermal modulus of elasticity to adiabatic modulus of elasticity is:
A) γ B) $\sqrt{\gamma}$
C) $\dfrac{1}{\gamma}$ D) $\dfrac{1}{\sqrt{\gamma}}$

Q.63 The relation between phase difference and path difference is:
A) $\phi = \dfrac{2\pi x}{\lambda}$ B) $\phi = \dfrac{2\pi \lambda}{x}$
C) $\phi = \dfrac{2\pi}{x}$ D) $\phi = \dfrac{2\pi}{\lambda}$

Q.64 Sound travels faster in moist air because (at STP):
A) Moist air is heavier than dry air
B) The value of γ of moist air is greater than that for dry air
C) The pressure of moist air is greater than that of dry air
D) The density of moist air is less than that of dry

Q.65 Sound takes some time to travel from one place to another. This time will be maximum,
A) At night   B) During summers
C) During winters   D) All the time

Q.66 Longitudinal wave consists of:
A) Crests and troughs   B) Crests and compressions
C) Compression and rarefactions   D) Troughs and & rarefactions

Q.67 Which of the following are medium independent?

A) Water waves   B) Standing waves

C) thermal waves   D) Sound waves

Q.68 A wave source of frequency 1000Hz radiate waves of wavelength 0.10m. The time taken by wave to travel 2500 m is:

A) 2.5 s   B) 4.0 s

C) 25 s   D) 12.5 s

Q.69 Figure shows the shape of part of a long string in which transverse waves are produced by attaching one end of the string to turning fork of frequency 250 Hz. What is the velocity of the waves?
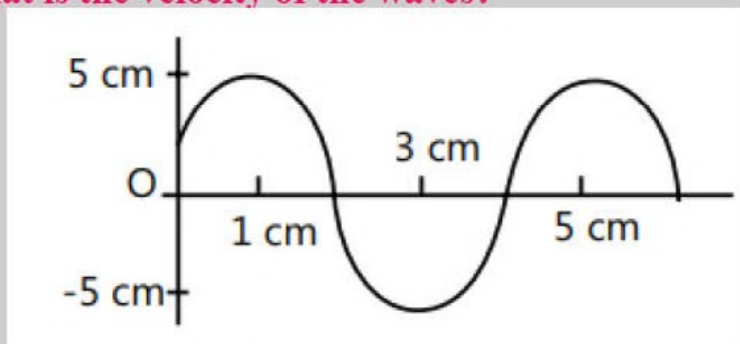
A) 10 m s^{-1} B) 20m s^{-1}

C) 15 m s^{-1} D) 25 m s^{-1}

Q.70 The distance between a crest and trough is:

A) $\dfrac{\lambda}{4}$ B) $\dfrac{\lambda}{6}$

C) $\dfrac{\lambda}{2}$ D) λ

Q.71 According to Laplace, when sound waves move through air, this is an:

A) Isothermal process   B) Isochoric process

C) Isobaric process   D) Adiabatic process

Q.72 Sound has maximum velocity in:

A) Solid   B) gases

C) Liquid   D) Smoke

Q.73 Which of the following has maximum value of ' γ '?

A) Mono atomic gas   B) Poly atomic gas

C) Diatomic gas   D) All have same value

Q.74 The speed of sound waves having a frequency of 256 Hz compared with the speed of sound having a frequency of 512 Hz is:

A) Half   B) Four times

C) Twice   D) Same

Q.75 Temperature of air is increased from 0°C to 273 °C, if density of air is increased from ρ_0 to ρ_t then ratio $\dfrac{\rho_t}{\rho_0}$ is equal to:

A) 1   B) 2

C) ½   D) 4

Q.76 At what temperature the speed of sound in air is 1.5 times than its value at 27°C

A) 102 ºC   B) 204 ºC

C) 204 K   D) 402 ºC

Q.77 The basic relation to find speed in any medium is

A) $V = \sqrt{\dfrac{F}{m}}$

B) $V = \sqrt{\dfrac{E}{\rho}}$

C) $V = \sqrt{\dfrac{\gamma P}{\rho}}$

D) $V = \sqrt{\dfrac{P}{\rho}}$

Q.78 The velocity of sound in air at STP, according to Newton's formula is:

A) 280 m s^{-1}

B) 330 m s^{-1}

C) 380 m s^{-1}

D) 340 m s^{-1}

Q.79 When two identical waves reach at a point simultaneously while travelling in same direction and having same frequency they t process occurring is (by principle of superposition):

A) Interference

B) Beats

C) Stationary waves

D) None of these

Q.80 Which one of the following changes can be observed in the resultant interference wave?

A) Amplitude

B) Wavelength

C) Time period

D) Frequency

Q.81 A wave generator produces 500 pulses in 10 seconds. Find period of pulses it produces

A. 50s

B. $\dfrac{1}{50} s$

C. $\dfrac{1}{5} s$

D. $\dfrac{10}{50} s$

Q.82 The speed of sound in the direction of wind relative to ground (where v is speed of sound and vw is speed of wind)

A. v

B. $v - vw$

C. $v + vw$

D. $v \pm vw$

Q.83 The speed of a wave on a particular string is 24 ms-1. If string is 6m long. Find its fundamental frequency

A. 2 Hz

B. 6 Hz

C. 4 Hz

D. 8 Hz

Q.84 The restoring force of SHM is maximum when particle:

A. Displacement is maximum

B. Half way between them

C. Crossing mean position

D. At rest

Q.85 In Doppler effect if the source moves towards the observer, the spectral line are shifted towards the

A. Blue end of spectrum

B. Either end of the spectrum

C. Red end of spectrum

D. None of these

Q.86 The distance between two consecutive antinodes is 0.5m. The distance travelled by the wave in half the time period is

A. 2 m

B. 0.5 m

C. 1 m

D. 0.25 m

Q.87 The phase difference between the particles vibrating at two consecutive nodes is:

A. Zero

B. π

C. $\pi/2$

D. 2π

Q.88 The third harmonic in an open organ pipe is known as

A. Fundamental frequency

B. Third overtone

C. Second overtone   D. First overtone

Q.89 **Which of the following laws of strings is not correct? Where "f" is frequency of string.**

A. $f \propto \dfrac{1}{\sqrt{m}}$

B. $f \propto \sqrt{T}$

C. $f \propto \ell$

D. $f \propto \dfrac{1}{\ell}$

Q.90 **Which of the property makes difference between progressive and stationary waves**

A. Amplitude   B. Frequency

C. Propagation of energy   D. Phase of the wave

Q.91 **The first overtone of a stretched wire of given length is 320 Hz. The first harmonic is:**

A. 320 Hz   B. 160 Hz

C. 480 Hz   D. 640 Hz

Q.92 **When an observer is approaching a stationary source with a velocity vo then the apparent change in frequency observed by him will be:**

A. $\dfrac{v}{v + v_o} f$

B. $\left(1 + \dfrac{v_o}{v}\right) f$

C. $\dfrac{v}{v_o} f$

D. $\dfrac{v_o}{v} f$

Q.93 **A source of sound of frequency 450 cycles/sec is moving towards a stationary observer with 34 m/sec speed. If the speed of sound is 340 m/sec, then the apparent frequency will be**

A. 410 cycles/sec   B. 500 cycles/sec

C. 550 cycles/sec   D. 450 cycles/sec

Q.94 **Sonar is used to detect**

A. Depth of sea   B. Under sea objects

C. Location of submarine   D. All of these

Q.95 **What would be the effect of increasing tension of stretched string on velocity of waves**

A. Increases   B. Decreases

C. Remain unchanged   D. None of these

Q.96 **If water waves oscillates up and down three times each second and distance between waves crest is 2, what is its wave speed.**

A. 3m/s   B. 6m/s

C. 1.5m/s   D. 9m/s

Q.97 **The essential properties of a medium for the propagation of mechanical waves are**

A. Inertia and mass   B. Inertia and elasticity

C. Elasticity only   D. Inertia only

Q.98 **What is the ratio of velocity to fundamental frequency for a closed organ pipe of length [1] ?**

A. 0   B. ℓ

C. 2ℓ D. 4ℓ

Q.99 **The frequency of a sound wave is n and its velocity is v. If the frequency is increased to 4n, the velocity of the wave will be**

A. v   B. 2v

C. 4v   D. v/4

Q.100 The nature of sound waves in gases is

A. Transverse

B. Longitudinal

C. Stationary

D. Electromagnetic

Q.101 The distance between a node and the next anti node of a stationary wave is 33 cm. If the velocity of sound is 330 m/s. The frequency is

A. 150 Hz

B. 200 Hz

C. 250 Hz

D. 300 Hz

Q.102 When an aero plane move towards airport, then the frequency of reflected wave from the aeroplane received by radar

A. Decreases

B. Increases

C. Remain some

D. Become zero

Q.103 The frequency of a rod is 200 Hz. If the velocity of sound in air is $340\,ms^{-1}$, the wavelength of the sound produced is

A. 1.7 cm

B. 6.8 cm

C. 1.7 m

D. 6.8 m

Q.104 An observer moves towards a stationary source of sound, with a velocity one fifth of the velocity of sound. What is the percentage increase in the apparent frequency?

A. zero

B. 0.5%

C. 5%

D. 20%

Q.105 Standing waves are produced in 10m long stretched string. If string vibrates in 5 segments and wave velocity is 20m/s, what is the frequency?

A. 10Hz

B. 5Hz

C. 20Hz

D. 4Hz

Q.106 If a string is fixed at both ends vibrates in "n" loops, then wave-length in term of length 'ℓ' of string is given by

A. $\dfrac{n\ell}{2}$

B. $\dfrac{\ell}{2n}$

C. $\dfrac{2\ell}{n}$

D. $\dfrac{2\ell}{v}$

Q.107 When two identical traveling waves are superimposed, velocity of resultant wave

A. Decreases

B. Increases

C. Remains same

D. Becomes zero

Q.108 The distance between 1st node and 4th antinode is:

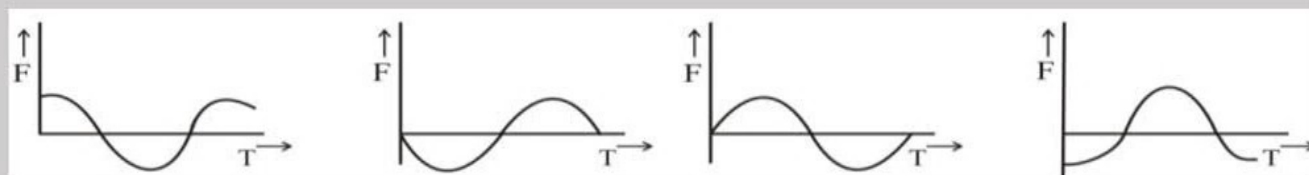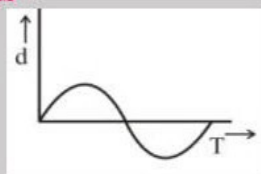A. $\dfrac{7}{4}\lambda$

B. $5\dfrac{\lambda}{4}$

C. $13\dfrac{\lambda}{4}$

D. $11\dfrac{\lambda}{4}$

Q.109 In the stretched string if speed of the wave is doubled, the tension will be

A. 2 times

B. 4 times

C. 8 times

D. 6 times

Q.110 Displacement time graph of particle executing SHM is shown. The corresponding force-time graph of particle is

A.   B.   C.   D.

Q.111 The distance covered by a body in one complete vibration is 20cm. What is the amplitude of body

A. 10 cm   B. 15 cm

C. 5 cm   D. 7.5 cm

Q.112 If V is the speed of sound at pressure P then speed of sound at 2P, keeping temperature constant, will be

A. $1:2$ B. $1:1$

C. $2:1$ D. $\sqrt{2}:1$

Q.113 Which of the following has maximum value of $\gamma = \dfrac{C_p}{C_v}$

A. Monoatomic gas   B. Polyatomic gas

C. Diatomic gas   D. All have same value

Q.114 Velocity of sound in air

A. Decreases with increase in temperature   B. Increase with decrease in temperature

C. Decreases with decrease of temperature   D. Does not depend on temperature

Q.115 At what temperature, the velocity of sound will be double its value at 273 K?

A. 2×273 K   B. 8×273 K

C. 4×273 K   D. 16×273 K

Q.116 Doppler's effect will not be applicable when the velocity of sound source is

A. Equal to that of the sound velocity   B. Less than the velocity of sound

C. Greater than the velocity of sound   D. Zero

Q.117 For all gases

A. $v_t = v_o \sqrt{1 - \dfrac{t}{273}}$ B. $v_t = v_o \sqrt{1 + \dfrac{t}{273}}$

C. $v_t = v_o \sqrt{1 + 273t}$ D. $v_t = v_o \sqrt{1 + \dfrac{273}{t}}$

Q.118 A source emits a sound of frequency of 400 Hz, but the listener hears it to be 390 Hz. Then

A. The listener is moving towards the source

B. The source is moving towards the listener

C. The listener is moving away from the source

D. The listener has a defective ear

Q.119 Sound travels faster in moist air at STP because
A. Moist air is heavier than dry air
B. The pressure of moist air is greater than that of dry air
C. The value of γ of moist air is greater than that for dry air
D. The density of moist air is less than that of dry air

Q.120 Newton assumed that sound propagation in a gas takes place under
A. Isothermal conditions
B. Isobaric condition
C. Adiabatic conditions
D. Isochoric condition

Q.121 If va, vh and vm are the speeds of sound in air, hydrogen and a metal at the same temperature, then
A. $v_h > v_a > v_m$
B. $v_m > v_h > v_a$
C. $v_h > v_m > v_a$
D. $v_a > v_h > v_m$

Q.122 A tuning fork completes 20 vibrations in 0.4 s. its frequency in (s^{-1})
A. 50
B. 60
C. 100
D. none of these

Q.123 If the number of loops of a stationary wave are increasing, then
A. λ increases
B. λ decreases
C. λ remains same
D. λ may increase or decrease

Q.124 A rope of length 5 m is stretched to a tension of 80 N. If its mass is 1 kg, at what speed would a 10 Hz transverse wave travel down the string?
A. 2 m/s
B. 5 m/s
C. 20 m/s
D. 50 m/s

Q.125 At which temperature the speed of sound in hydrogen will be same as that of speed of sound in oxygen at 100ºC
A. – 148ºC
B. – 212.5ºC
C. – 317.5ºC
D. – 249.7ºC

Q.126 A stationary wave is set up in the air column of a closed pipe. At the closed end of the pipe:
A. Always a node is formed
B. Always an antinode is formed
C. Neither node nor antinode is formed
D. Sometimes a node and sometimes an antinode is formed

Q.127 A string, clamped at its ends, vibrates in three segments. The string is 100cm long. The wavelength is:
A. 33.3cm
B. 150cm
C. 66.7cm
D. 300cm

Q.128 A police motor cycle running at 130 Km/hr sounds a siren of 2 KHz frequency while chasing a car running at 150 Km/hr. the apparent frequency of the siren head by the car driver will be:
A. Greater than 2 Khz
B. 2 KHz
C. The siren will not be head by the car driver
D. Less than 2 KHz

Q.129 Length of a string tied to two rigid supports is 40 cm. Maximum length (wavelength in cm) of a stationary wave produced on it, is
A. 20
B. 10
C. 80
D. 40

Q.130 In strings, the position of antinodes are obtained at
A. $\lambda, 2\lambda, 3\lambda$
B. $2\lambda, 4, 6\lambda$

C. $0, \frac{\lambda}{2}, \lambda$　　　　　　　　D. $\frac{\lambda}{4}, \frac{3\lambda}{4}, \frac{5\lambda}{4}$

Q.131 The displacement of a body performing S.H.M is $x = 0.86 \cos\left(\frac{\pi}{4}\right)t$ the amplitude of motion and frequency of oscillation will be:
A) 0.43, 0.125　　　　　　　　B) 0.86, 0.125
C) 1, 0.125　　　　　　　　D) 0.28, 0.1

Q.132 A simple harmonic oscillator has a time period of 0.25 s. which equation relates its acceleration "a" with displacement "x"
A) $a = -16\pi^2 x$　　　　　　　　B) $a = -64\pi^2 x$
C) $a = -2\pi^2 x$　　　　　　　　D) $a = -8\pi^2 x$

Q.133 When an observer moves towards a stationary source, then the frequency of sound will become:
A) $f_A = \left(\frac{v - u_0}{v}\right)f$　　　　　　　　B) $f_B = \left(\frac{v + u_0}{v}\right)$
C) $f_c = \left(\frac{v}{v - u_s}\right)f$　　　　　　　　D) $f_D = \left(\frac{v}{v - u_s}\right)f$

Q.134 A stretched string of length 3 m vibrates in 8 segments the distance between consecutive nodes is:
A) 0.75 m　　　　　　　　B) 0.5 m
C) 0.25　　　　　　　　D) 1 m

Q.135 The fundamental frequency of a closed organ pipe is 75 Hz. The frequency of the third harmonic is:
A) 300 Hz　　　　　　　　B) 375 Hz
C) 225 Hz　　　　　　　　D) 400 Hz

Q.136 If the tension in a string stretched between two fixed points is made nine times, the frequency of the sixth harmonic will become
A) Two times　　　　　　　　B) Three times
C) Twelve times　　　　　　　　D) Six times

Q.137 When two identical waves move in opposite direction, they give rise to:
A) Stationary waves　　　　　　　　B) Constructive interference
C) Beats　　　　　　　　D) Destructive interference

Q.138 Which of the following is/are not essential for simple harmonic motion?
A) Restoring force　　　　　　　　B) Inertia
C) Both A B　　　　　　　　D) None of these

Q.139 A source of sound moves towards a stationary observer with a speed 1/3 times that of sound. if the frequency of the sound from the source is 125 Hz, the apparent frequency of the sound heard by the observer is:
A) 162.5 Hz　　　　　　　　B) 187.5 Hz
C) 212.5 Hz　　　　　　　　D) 237.5 Hz

Q.140 The three lowest, frequencies (in Hz) with which a 10 cm long pipe, closed at one end, can vibrate are (speed of sound = 400 m s⁻¹):
A) 1000, 3000, 5000　　　　　　　　B) 50, 150, 250
C) 900, 1800, 2700　　　　　　　　D) 900, 2700, 4500

Q.141 Which of the following can't be the set of frequencies for stationary waves in a stretched string?
A) 150 Hz, 300 Hz, 450 Hz, 600 Hz....
B) 400 HZ, 800 Hz,1200 Hz,1600 Hz, ...
C) 100 Hz, 300 Hz, 500 Hz
D) Both "A" & "B"

Q.142 The fundamental note produced by an open organ pipe has frequency n. The fundamental note produced by a closed organ pipe of the same length will have frequency:

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

B) 2n

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

D) 4n

Q.143 The distance between two consecutive nodes or antinode is:

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

B) λ

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

D) 2λ

Q.144 The time taken by a simple harmonic oscillator to move from half of extreme-to-extreme

A) $\frac{T}{4}$

B) $\frac{T}{6}$

C) $\frac{T}{8}$

D) $\frac{T}{12}$

Q.145 The time taken by a simple harmonic oscillator to move from half of extreme to mean position is:

A) $\frac{T}{4}$

B) $\frac{T}{8}$

C) $\frac{T}{6}$

D) $\frac{T}{12}$

Q.146 For SHM having amplitude 4 cm, displacement of the particle from the mean position after $\frac{T}{8}$ sec will be:

A) 1 cm

B) 4 cm

C) 2.8 cm

D) 8 cm

Q.147 If the equation of S.H.M become $x = -x_0 \sin \theta$, then value of initial phase must be:

A) 90°

B) 60°

C) 180°

D) 270°

Q.148 At which of the following factors, the apparent frequency of wave source does not depend regarding Doppler's effect

A) Speed of source

B) Speed of observer

C) Relative velocity between source and observer

D) Distance between source and observer

Q.149 The source is moving away a stationary observer, then the pitch of the sound will:

A) Decrease

B) Remain same

C) Increase

D) Can't be predicted

Q.150 A tube, closes at one end and containing air, produces, when excited, the fundamental note of frequency 275 Hz. If the tube is open at both ends, the fundamental frequency that can be excited is, (in Hz):

A) 275 Hz

B) 550 Hz

C) 825 Hz

D) 1100 Hz

Q.151 Which of the following is least rich in harmonics for stationary waves?

A) Stretched string

B) Pipe open at both ends

C) Pipe open at one end

D) Both "A" & "B"

Q.152 A closed organ pipe and an open organ pipe have their third overtones of the same frequency Their lengths are in the ratio (respectively):

A) 8:7

B) 7:8

C) 1:4

D) 1:2

Q.153 The displacement of simple harmonic oscillator while it moves towards the mean position is:

A) Parallel to restoring force
B) Parallel to acceleration
C) Both "A" & "B"
D) Remains at 1800 shift with "F_r or "a"

Q.154 The equation or displacement of a body executing SHM is $x\ t = x_0 \cos \omega\ t$, what is the initial phase:

A) 0°
B) 90°
C) 60°
D) 180°

Q.155 If the initial phase for a simple harmonic oscillator is 270 then body:

A) Will be moving towards means position
B) Will be moving away from mean position
C) Will be moving towards negative extreme
D) Both B & C

Q.156 Due to Doppler's effect, a wavelength in the middle of the visible spectrum will be shifted towards red when source:

A) Moves towards observer
B) Moves away from observer
C) Does not move
D) Cannot be predicated

Q.157 The Stretched string of length 2 m has mass per unit length 1 gm^{-1} the tension in the string is 40 N. if it is plucked at distance of 50 cm from one end, the frequency of the vibration will be:

A) 75 Hz
B) 50 Hz
C) 100 Hz
D) 25 Hz

Q.158 A stretched string is plucked at length of $\frac{\ell}{4}$

A) 4
B) 2
C) 1
D) 3

Q.159 A string of length ℓ, fixed at both ends, is vibrating in eight loops, the wave length of the corresponding wave is:

A) $\frac{\ell}{2}$
B) $\frac{\ell}{4}$
C) ℓ
D) 4ℓ

Q.160 Speed of sound in air is 350 ms^{-1} between two successive nodes of a stationary wave of frequency 70 Hz is:

A) 5 m
B) 2.5 m
C) 1.25 m
D) 1 m

Q.161 The velocity of a particle, undergoing S.H.M is "v" at the mean position if its amplitude is quartered, the velocity at the mean position will be:

A) v/2
B) 2v
C) v/4
D) 4v

Q.162 A particle is executing S.H.M, then the graph of acceleration as a function of displacement is:

A) Straight line
B) Circle
C) Ellipse
D) Hyperbola

Q.163 For an object executing simple harmonic motion the graph between force versus instantaneous displacement is:

A)

B)

C)

D)
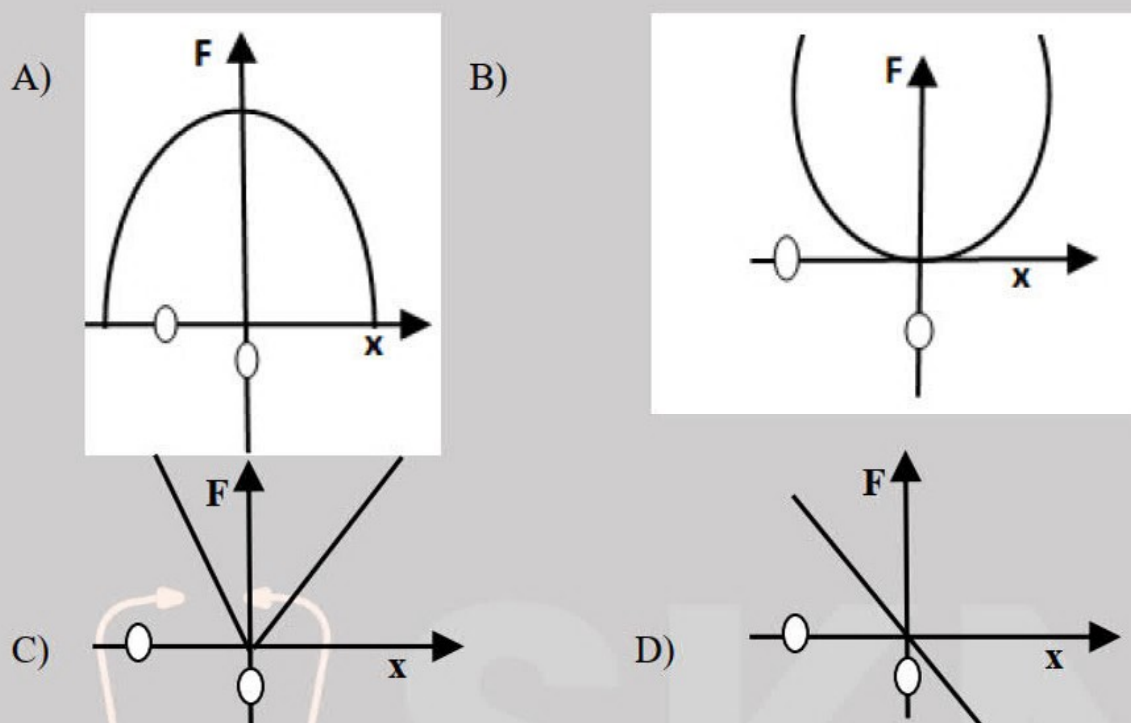
Q.164 The product of angular frequency w and time period T will be:

A) 1

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

C) 2π

D) π

Q.165 The equation for instantaneous displacement of a particle executing SHM is given as: $X = 0.25 \cos\left(\frac{\pi}{8}\right)t$

What is the displacement of the particle after 2 s?

A) 0.23 m

B) 0.18m

C) 0.12m

D) 0.08 m

Q.166 A string of length ℓ, fixed at both ends, is vibrating in five segments, wave length of the corresponding wave is

A) $\frac{5\ell}{2}$

B) $\frac{2\ell}{5}$

C) $\frac{7\ell}{2}$

D) $\frac{3\ell}{5}$

Q.167 When a source of sound moves away from a stationary observer, the frequency observed is $\frac{1}{5}$ times the original frequency. Given speed of sound = 350 ms⁻¹. The speed of the source is:

A) 700 m s⁻¹

B) 900 m s⁻¹

C) 1400 m s⁻¹

D) 350 m s⁻¹

Q.168 The frequency of the fifth harmonic emitted by a string of length ℓ, clamped at both ends is (v is the velocity of waves in the string):

A) $\frac{v}{\ell}$

B) $\frac{5v}{4\ell}$

C) $\frac{v}{2\ell}$

D) $\frac{5v}{2\ell}$

Q.169 An observer moves towards a stationary source of sound with a speed $\frac{1}{5th}$ of the speed of sound. The wavelength and frequency of waves emitted by the source are "λ" and "f" respectively. apparent frequency and wavelength recorded. the observer is respectively.

A) $1.2f, 1.2\lambda$
B) $f, 1.1\lambda$
C) $1.2 f, \lambda$
D) $0.8 f, 0.8\lambda$

Q.170 When a source moves away from a stationary observer then?

A) Frequency decreases
B) Wavelength remains same
C) Wavelength increases
D) Both A & C

Q.171 Stars moving towards earth show:

A) Red shift
B) Blue shift
C) Green shift
D) Yellow shift

Q.172 Doppler's effect can be applied on:

A) Longitudinal waves only
B) Mechanical waves only
C) Transverse waves only
D) Both mechanical and non-mechanical waves

Q.173 An Open organ pipe sounds a fundamental note of the frequency 200 Hz. if the speed of sound in air is 350 m s^{-1}, then the length of the pipe is nearly;

A) 0.87 m
B) 3.50 m
C) 1.75 m
D) 1.5 m

Q.174 The relation for speed of stationary wav produced in a stretched string and mass per unit length "m" is:

A) $v \propto \frac{1}{\sqrt{m}}$
B) $v \propto \frac{1}{m}$
C) $v \propto \sqrt{m}$
D) $v \propto m$

Q.175 The speed of a wave in the string of guitar is 500 m s^{-1}. If the length of string is 0.5 m, then fundamental frequency of sound waves is:

A) 500 Hz
B) 175 Hz
C) 100 Hz
D) 250 Hz

Q.176 Angular frequency is basically a characteristic of:

A) Circular motion
B) Vibratory motion
C) Linear motion
D) Elliptical motion

Q.177 The displacement of particle executing S.H.M having initial phase of 90 in half of the time period, if the amplitude motion is "A" will be?

A) Zero
B) A
C) 2A
D) 4A

Q.178 A body moves with simple harmonic motion and makes n complete oscillations two seconds. What is the angular frequency?

A) π n rad s^{-1}
B) $\frac{1}{n}$ rad s^{-1}
C) 2π n rad s^{-1}
D) $\frac{2\pi}{n}$ rad s^{-1}

Q.179 A tube open at both ends and containing air, produces, when excited, the fundamental note of frequency 50 Hz. If the tube is open at one end, the fundamental frequency that can be excited is (in Hz)

A) 250 Hz
B) 125 Hz
C) 500 Hz
D) 1000 Hz

Q.180 Stationary waves of frequency 700 Hz are formed in a medium in which the velocity of sound is 250 m s^{-1}, the distance between a node and the neighboring antinode is:

A) 0.12 m   B) 0.25 m
C) 0.5 m   D) 1 m

Q.181 An engine running at speed $\frac{v}{3}$ sounds whistle of frequency 100 Hz. A passenger on the platform where the engine arrives finds frequency of whistles as (take speed of sound=350 m s^{-1})

A) 75 Hz   B) 150 Hz
C) 100 Hz   D) 350 Hz

Q.182 When an observer moves towards a stationary source then:

A) Frequency increases   B) Wavelength increases
C) Relative speed of sound increases   D) Both A and B

Q.183 Stars moving away from earth shows:

A) Increase in wavelength   B) Decrease in wavelength
C) Both A and B   D) Increase in frequency

Q.184 When a source moves towards a stationary observer then we use relation to find frequency of sound as?

A) $f' = \dfrac{v}{v + u_s} \times f$ B) $f' = \dfrac{v}{v - u_s} \times f$

C) $f' = \dfrac{v + u_s}{v} \times f$ D) $f' = \dfrac{v - u_s}{v} \times f$

Q.185 A geo-stationary satellite emits a light signal which is observed by an observer on earth then according to observer the frequency of wave will

A) Increase   B) Decrease
C) Remain same   D) zero

Q.186 The relation between speed of stationary wave produced in a stretched string and tension in string is:

A) $v \propto \sqrt{F}$ B) $v \propto \dfrac{1}{\sqrt{F}}$

C) $v \propto F$ D) $v \propto \dfrac{1}{F}$

Q.187 Standing waves are produced in a 10 m long stretched string, if the string vibrates in 5 segments and wave velocity is 50 m s^{-1} the frequency is:

A) 12.5 Hz   B) 25.0 Hz
C) 6.25 Hz   D) 37.5 Hz

Q.188 Standing or stationary waves are the result of superposition of two identical waves travelling in:

A) Same direction   B) Opposite
C) At right angle   D) Any of these

Q.189 One complete round trip of a vibrating body called:

A) Frequency   B) Vibration
C) Time period   D) Amplitude

Q.190 10 cm extension is produced in a string due to a force of 20 N. The spring constant is:

A) 2 N m^{-1} B) 200 N m^{-1}
C) 20 N m^{-1} D) 2000 N m^{-1}

Q.191 Which of the following statements is wrong?
A) Sound travels in straight line
B) Sound is a form of energy
C) sound travels in the form of waves
D) Sound travels faster in vacuum than in air

Q.192 Ultrasonic, Infrasonic and audible waves travel through a medium with speeds Vu, Vi and Va respectively, then:
A) Vu, Vi and Va are equal
B) Va ≥ 2 Vi ≥ Va
C) Va ≤ Va ≤ Vi
D) Va ≤ Vu and Vu ≈ Vi

Q.193 A tuning fork makes 256 vibrations per second in air. When the velocity of sound is 330 m/s, then wavelength of the tone emitted is:
A) 0.56 m
B) 1.11 m
C) 0.89 m
D) 1.29 m

Q.194 In the diagram below, the interval PQ represents:
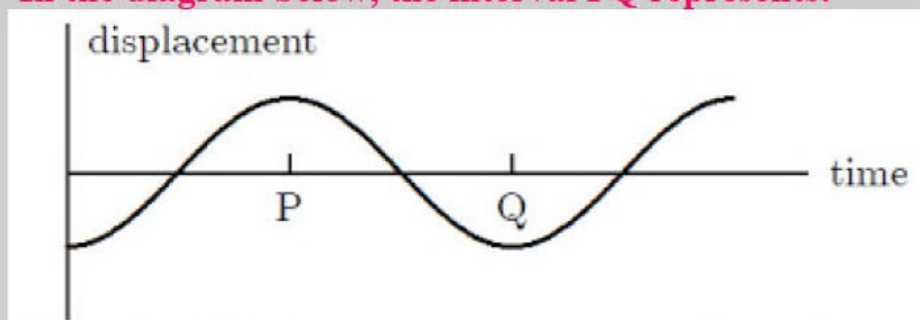
A) wavelength/2
B). wavelength
C). 2 x amplitude
D). period / 2 E. Period

Q.195 The relation between phase difference ($\Delta\phi$) and path difference (Δx) is
A) $\Delta\phi = \dfrac{2\pi}{\lambda}\Delta X$
B) $\Delta\phi = \dfrac{2\pi\lambda}{\Delta X}$
C) $\Delta\phi = 2\pi\lambda\Delta X$
D) $\Delta\phi = \dfrac{2\Delta X}{\lambda}$

Q.196 In a medium sound travels 2 km in 3 sec and in air, it travels 3 km in 10 sec. The ratio of the wavelengths of sound in the two media is
A) 1 : 8
B) 8 : 1
C) 1 : 18
D) 20 : 9

Q.197 Speed and frequency of a wave are 320 ms-1 and 400 Hz respectively. What is the phase difference between two points on the wave 0.2 m apart?
A) 0°
B) 45°
C) 90°
D) 60°

Q.198 If velocity of sound in a gas is 360 m/s and the distance between a compression and the nearest rarefaction is 1m, then the frequency of sound
A) 90 Hz
B) 360 Hz
C) 180 Hz
D) 720Hz

Q.199 The velocity of the sound in air would become double than its velocity at 20°C is:
A) 40°C
B) 80°C
C) 899°C
D) 1172°C

Q.200 When sound waves travel from air to water, which of the following remains constant?
A) Velocity
B) Wavelength
C) Frequency
D) All the above

Q.201 The phase difference between two points separated by 1m in a wave of frequency 120 Hz is 90°. The wave velocity is
A) 180 m/s
B) 480 m/s

C) 240 m/s   D) 720 m/s

Q.202 The frequency of a sound wave is n and Its velocity is v. If the frequency 15 increased to 4n, the velocity of the wave will be

A) v   B) 4v

C) 2v   D) v/4

Q.203 The speed of a wave in a certain medium is 960 m/s. If 3600 waves pass over a certain point of the medium in 1 minute, the wavelength is

A) 2 meters   B) 8 meters

C) 4 meters   D) 16 meters

Q.204 Two sound waves having a phase difference of $60°$ have path difference of

A) 2λ B) $\dfrac{\lambda}{6}$

C) $\dfrac{\lambda}{2}$ D) $\dfrac{\lambda}{3}$

Q.205 Water waves are

A) Longitudinal   B) Transverse

C) Both longitudinal and transverse   D) neither longitudinal nor transverse

Q.206 Speed of sound in air at pressure P is v. If pressure is doubled then speed of sound becomes:

A) v   B) v/2

C) 2v   D) 2 v

Q.207 Which of the following is not the transverse wave?

A) X-rays   B) Visible light wave

C) y-rays   D) Sound wave in a gas

Q.208 A travelling wave passes a point of observation. At this point, the time interval between successive crests is 0.2 seconds and

A) T e wavelength is 5 m   B) The frequency is 5 Hz

C) The velocity of propagation is 5 m/s   D) the wavelength is 0.2 m

Q.209 Which of the following emits sound of higher pitch?

A) Mosquito   B) Lion

C) Man   D) Donkey

Q.210 If the phase difference between the two wave is 2n during superposition, then the resultant amplitude is

A) Maximum   B) Maximum or minimum

C) Minimum   D) zero

Q.211 The intensity ratio of two waves is 1:16. The ratio of their amplitudes is

A) 1: 16   B) 4: 1

C) 1: 4   D) 2: 1

Q.212 When the wave propagates, what is true about points "P" and "C" in the below figure?
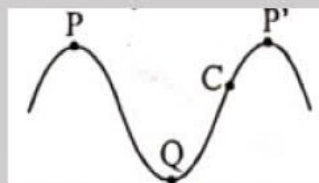
A) They are always in-phase with each other

B) Sometimes in-phase but sometimes out-of-phase

C) They are always out-of-phase with each other

D) Neither in-phase nor out-of-phase

Q.213 Standing waves are produced in a 10 ms⁻¹ long stretched string, if the string vibrates in 5 segments and the wave velocity is 20 ms⁻¹ then the frequency is:

A) 2 Hz
B) 4 Hz
C) 5 Hz
D) 20 Hz

Q.214 Which of the following can be the set of frequencies for stationary waves in a stretched string?

A) 100 Hz, 200 Hz, 300 Hz, ...
B) 200 Hz, 400 Hz, 600 Hz, ...
C) 100 Hz, 300 Hz, 500
D) B0th A and B

Q.215 The distance between the nearest node and anti-node in a stationary wave is

A) λ
B) $\frac{\lambda}{4}$
C) $\frac{\lambda}{2}$
D) 2λ

Q.216 Which of the property makes difference between progressive and stationary waves?

A) Amplitude
B) Propagation of energy
C) Frequency
D) Phase of the wave

Q.217 Stationary waves are formed when

A) Two waves of equal amplitude and equal frequency travel along the same path in opposite directions
B) Two waves of different wavelength and equal amplitude travel along the same path with equal speeds in opposite directions
C) Two waves of equal wavelength and equal phase travel along the same path with equal speed
D) Two waves of equal amplitude and equal speed travel along the same path in opposite direction

Q.218 At what angle the two superposing waves, each of amplitude A, will produce a resultant that also has amplitude of A?

A) 0°
B) 45°
C) 76°
D) 120°

Q.219 Stationary waves of frequency 300 Hz are formed in a medium in which the velocity of sound is 1200 meter/sec. The distance between a node and the neighboring anti node is

A) 1 m
B) 3 m
C) 2 m
D) 4 m

Q.220 Energy is not carried by Which of the following waves

A) Stationary
B) Transverse
C) Progressive
D) Electromagnetic

Q.221 In stationary waves

A) Energy is uniformly distributed
B) Energy is minimum at nodes and maximum at antinodes
C) Energy is maximum at nodes and minimum at antinodes
D) Alternating maximum and minimum energy producing at nodes and antinodes

Q.222 A string fixed at both the ends is vibrating in two segments. The wavelength of the corresponding

A) ℓ /4
B) ℓ
C) ℓ/2
D) 2/ℓ

Q.223 A 1 cm long string vibrates with fundamental frequency of 256 Hz. If the length is reduced to 1/4 cm keeping the tension unaltered, the new fundamental frequency will be

A) 64
B) 512
C) 256
D) 1024

Q.224 What is the intensity of threshold of hearing?

A) 10^{-10} Wm^{-2}
B) 10^{-11} Wm^{-2}
C) 10^{-12} Wm^{-2}
D) 110^{-13} Wm^{-2}

Q.225 The velocity of waves in a string fixed at both ends is 2 m/s. The string forms standing waves with nodes 5.0 cm apart. The frequency of vibration of the string in Hz is V

A) 40
B) 20
C) 30
D) 10

Q.226 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) Four times
C) Twice
D) Eight times

Q.227 Four wires of identical length, diameters and of the same material are stretched on a sonometer wire. If the ratio of their tensions Is 1: 4 : 9 : 16 then the ratio of their fundamental frequencies are

A) 16 : 9 : 4 : 1
B) 1 : 4 : 2 : 16
C) 4 : 3 : 2 : 1
D) 1 : 2 : 3 : 4

Q.228 If you set up the seventh harmonic on a string fixed at both ends, how many nodes and antinodes are set up in it

A) 8, 7
B) 8, 9
C) 7, 7
D) 9,8

Q.229 If you set up the ninth harmonic on a string fixed at both ends, its frequency compared to the seventh harmonic

A) Higher
B) Equal
C) Lower
D) None of the above

Q.230 A tube closed at one end and containing air is excited. It produces the fundamental note of frequency 512 Hz. If the same tube is open at both the ends the fundamental frequency that can be produced is

A) 1024 Hz
B) 256 Hz
C) 512 Hz
D) 128 Hz

Q.231 A closed pipe and an open pipe have their first overtones Identical in frequency. Their length is in the ration

A) 1 : 2
B) 3 : 4
C) 2 : 3
D) 4 : 5

Q.232 An air column in a pipe, which is closed at one end, will be in resonance with a vibrating body of frequency 166 Hz, if the length of the air column is (speed of sound = 332 mis)

A) 2.00 m
B) 1.00 m
C) 1.50m
D) 0.50 m

Q.233 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) $4 \times \dfrac{330}{4}$ Hz
B) $2 \times \dfrac{330}{4}$ Hz
C) $3 \times \dfrac{330}{4}$ Hz
D) $2 \times \dfrac{4}{330}$ Hz

Q.234 The fundamental note produced by a closed organ pipe is of frequency f. The fundamental note produced by a same length will be of frequency

A) f/2   B) 2f

C) f   D) 4 f

Q.235 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 its third overtone are in resonance with a given tuning fork. The ratio of lengths of P_1 and P_2 is:

A) 1 : 2   B) 3 : 8

C) 1 : 3   D) 3 : 4

Q.236 A resonance air column closed at one end 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) 150 m/s

C) 200 m/s   D) 75 m/s

Q.237 If the length of a closed organ pipe is 1.5 m and velocity of sound is 330 m/s, then the frequency or the second note is

A) 220 Hz   B) 110 Hz

C) 165 Hz   D) 55 Hz

Q.238 Doppler shift in frequency does not depend upon

A) The frequency of the wave produced

B) The velocity of the source

C) The velocity of the observer

D) Distance from the source to the listener

Q.239 A source of sound of frequency 450 cycles/sec is moving towards a stationary observer with 34 m/c speed. If the speed of sound is 340 m/sec, then the apparent frequency will be

A) 410 cycles/sec   B) 550 cycles/sec

C) 500 cycles/sec   D) 450 cycles/sec

Q.240 The wavelength is 120 cm when the source is stationary. If the source is moving with relative velocity of 60 m/sec towards the observer, then the wavelength of the sound wave reaching to the observer will be (velocity of sound = 330 m/s)

A) 98 cm   B) 120 cm

C) 140 cm   D) 144 cm

Q.241 When a source of sound moves away from a stationary observer, the frequency observed is 6/7 times the original frequency. The speed of the source is (velocity of sound = 330 m/s):

A) 40 ms^{-1} B) 332 ms^{-1}

C) 55 ms^{-1} D) 7332 ms^{-1}

Q.242 An observer moves towards a stationary source of sound with a speed $\frac{1}{5th}$ of the speed of sound. The wavelength and frequency of waves emitted by the source are "λ" and "f" respectively. apparent frequency and wavelength recorded. the observer is respectively.

A) 1.2f, 1. 2λ B) f, λ

C) 1.2 f, λ D) f, 1.2λ

Q.243 The Doppler's effect is applicable for

A) Light waves   B) Space waves

C) Sound waves   D) Both A and C

Q.244 A source of sound omits waves with frequency f Hz and speed v m/sec. Two observers move away from this source in opposite directions each with a speed 0.2 V relative to the source. The ratio of frequencies heard by the two observers will be

A) 3 : 2   B) 1 : 1
C) 2 : 3   D) 4 : 10

Q.245 An observer is moving towards the stationary source of sound, then

A) Apparent frequency will be less than the real frequency
B) Apparent frequency will be equal to greater than the real frequency
C) Apparent frequency will be equal to real frequency
D) only the quality of sound will change

Q.246 A sound source is moving towards stationary listener with 1/10th of the speed of the sound. The ratio of apparent to the real frequency is:

A) $(9/10)^2$ B) $(10/9)$
C) $(11/10)$ D) $(11/10)^2$

Q.247 A source of sound is moving with constant velocity of 20 m/s emitting a note of frequency 1000 Hz. The ratio of frequencies observed by a stationary observer while the source is approaching him and after it crosses him will be (Speed of sound 340 m/s) M

A) 9 : 8   B) 10 : 9
C) 8 : 9   D) 9 : 10

Q.248 Wave which cannot travel in vacuum is

A) X-rays   B) Ultraviolet
C) Infrasonic   D) Radio waves

Q.249 The speed of electromagnetic wave in vacuum depends upon the source of radiation

A) Increases as we move from γ-rays to radio waves
B) Decreases as we move from γ-rays to radio waves
C) Is same for all of them
D) None of these

Q.250 If $\vec{E}$ and $\vec{B}$ are the electric and magnetic field vectors of E.M. waves then the direction of propagation of E.M. wave is along the direction of

A) $\vec{E}$ B) $\vec{E} \times \vec{B}$
C) $\vec{B}$ D) None of these

Q.251 When water waves pores from deep water into shallow water, how do frequency, wave length and speed changes:

	Frequency	Wavelength	Speed
A)	Increases	Decreases	No change
B)	No change	Decreases	Decreases
C)	No change	Increases	Increases
D)	Decrease	No change	No change

Q.252 Which of the following changes when a wave changes its medium?

A) Speed   B) Wavelength
C) Frequency   D) Both A and B

Q.253 Figure shows the shape of part of a long string in which transverse waves are produced by attaching one end of the string to tuning fork of frequency 500 Hz What is the velocity of the waves?
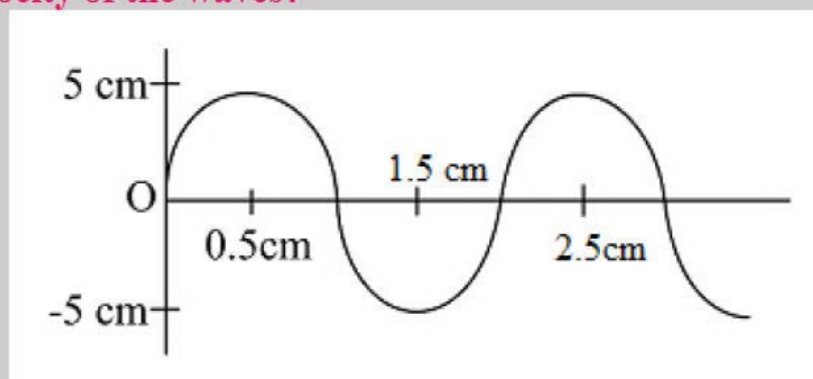
A) 20 m s⁻¹   B) 5 m s⁻¹
C) 10 m s⁻¹   D) 50m s⁻¹

Q.254 The speed of a wave in a medium is 250 ms⁻¹. If 50 waves pass through a point in that medium in 10 seconds, its wavelength is:
A) 40 m   B) 50 m
C) 60 m   D) 70 m

Q.255 The diagram shows a wave. Which of the following is the phase difference between points "C" and "E"?

A) 2π B) 3π
C) π D) 4π
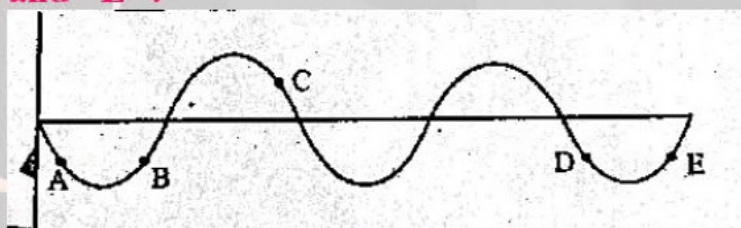
Q.256 The diagram shows a water wave in a ripple tank.
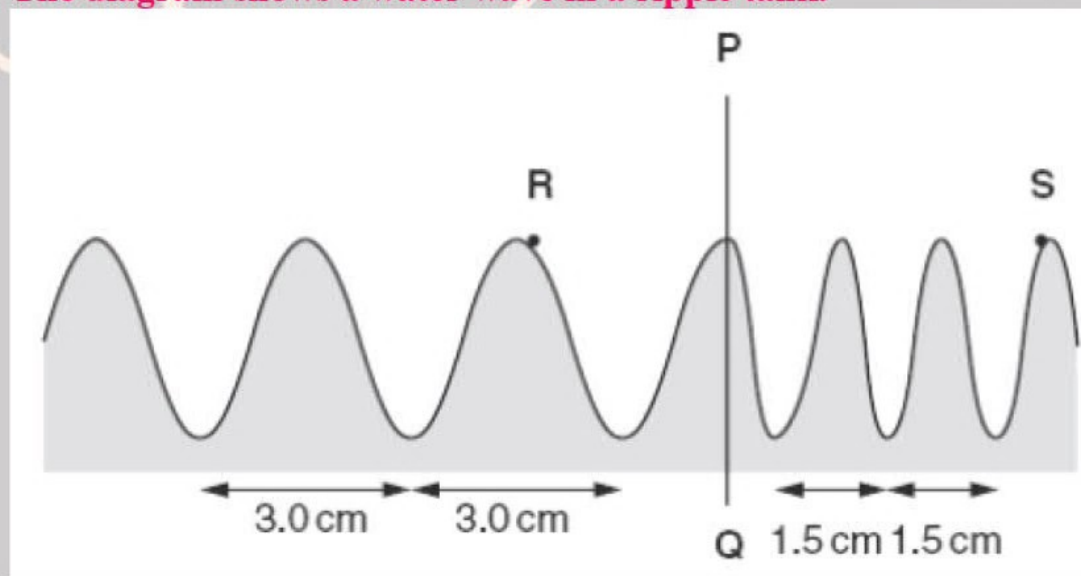
The wave has a speed of 50 m s⁻¹ at R. The wave crosses boundary PQ where the distance between crests changes from 4.0 cm to 2.0 cm. What is the Velocity of the wave at point S?
A) 50 m/s   B) 25 m/s
C) 12.5 m/s   D) 6.25 m/s

Q.257 Two waves having same frequency and travelling in same direction give rise to:
A) Beats   B) Stationary waves
C) Interference   D) Standing waves

Q.258 According to Newton, when sound waves move through air, this is an:
A) Isothermal process
B) Isochoric
C) Isobaric
D) Adiabatic

Q.259 Which of the following has maximum audible range?
A) Dolphin
B) Dog
C) Bat
D) Cat

Q.260 The speed of sound in moist air as compared to dry air is:
A) Same
B) Smaller
C) Greater
D) Cannot be predicated

Q.261 The error in the value of speed of sound calculated by Newton at S.T.P is about
A) 14%
B) 16%
C) 15%
D) 18%

Q.262 Which of the following is a wrong statement?
A) Sound waves transport energy
B) Sound waves travel in straight line
C) Sound waves travel adiabatically
D) Sound waves travel faster in vacuum than in air

Q.263 Speed of sound in solids is greater than in air, it
A) $E_{air} > E_{solid}$
B) $E_{solid} > E_{air}$
C) $P_{air} < P_{solid}$
D) $P_{solid} < P_{air}$

Q.264 Ratio of speed of sound in oxygen and in h hydrogen at Same temperature is:
A) 1: 4
B) 4: 1
C) 1: 16
D) 1: 1

Q.265 Mechanical waves can be:
A) Longitudinal only
B) Transverse only
C) Both longitudinal and transverse
D) None of these

Q.266 Which of the following is a wrong statement?
A) Sound waves transport energy
B) Sound waves are mechanic waves
C) Sound waves travel adiabatically
D) Sound waves travel faster in vacuum than in air,

Q.267 Two identical waves of same "f" moving towards the same destination such that both have an amplitude of 2 cm reached at a point simultaneously. After the interference at that point the resultant wave emerges with an amplitude of 2 cm. for which value of phase difference it has happened?
A) $\theta = 60°$
B) $\theta = 120°$
C) $\theta = 180°$
D) Not possible

Q.268 A machine gun mounted on a tank moving at a speed of 70 m s^{-1} towards a target with the gun pointed in the direction of motion of the tank. The muzzle speed of the bullet equals the speed of sound = 350 m/s If at the time of firing, the target is 1000 m away from the tank, then:
A) The bullet arrives at target earlier than sound
B) The bullet arrives at target after sound
C) The bullet a sound arrives at the same time
D) The bullet will never arrive at target

Q.269 The time taken by the particle to travel between a trough and crest in a transverse wave is:
A) T
B) $\frac{3T}{4}$
C) $\frac{T}{2}$
D) $\frac{T}{4}$

Q.270 A wave, which transfers energy by moving away from the source of disturbance is called:

A) Travelling wave
B) Standing wave
C) Progressive wave
D) Both A C

Q.271 The waves that require medium for propagation are:

A) Transverse
C) Mechanical
B) Non-mechanical
D) All of these

Q.272 When a jet fighter moves faster than air, a huge sound is produced that is lied:

A) Big — bang
C) Ultra-boom
B) Sonic — boom
D) Infra boom

Q.273 Pressure of air and temperature become 4 times, its effect on speed of sound in air is:

A) No change
C) Half
B) Double
D) Four times

Q.274 Path difference of $\frac{\lambda}{4}$ is equivalent to phase-difference of:

A) 90°
C) 180°
B) 360°
D) 0°

Q.275 At what temperature, the velocity of sound will be double its value at 273 K?

A) 2×273 K
C) 4×273 K
B) 8×273 K
D) 16×273 K

Q.276 When two identical waves reach at a point simultaneously having same frequency then the process may not be:

A) Interference
C) Beats
B) Stationary waves
D) None of these

Q.277 Points in wave having identical displacement and same direction of motion are:

A) In phase
C) Does not have a relation
B) Out of phase
D) None of these

Q.278 Speed of sound in air at STP is 332 m s⁻¹. The speed of sound in air at 0°C and 4 atm is:

A) 332 m/s
C) 360 m/s
B) 340 m/s
D) 380 m/s

Q.279 Which of the following has minimum value of $\gamma = \frac{C_p}{C_v}$?

A) Monoatomic gas
C) Polyatomic gas
B) Diatomic gas
D) All have same value

Q.280 The velocity of sound increased by approximately_____ when temperature rises by

A) 0.61 m/s
C) 610 mm/s
B) 61 cm/s
D) 6.1 m/s

Q.281 Which of the following remains constant, while a body performing the S.H.M.

I. Acceleration
III. Amplitude
II. Velocity
IV. Total Energy

A) I only
C) III & IV only
B) I & IV only
D) II & III & IV

Q.282 Which of the following is/are correct statement for a body performing S.H.M:

I. Acceleration is maximum where Kinetic energy is maximum

II. Velocity is maximum where the displacement is zero

III. Velocity is maximum where acceleration is zero

IV. Acceleration is maximum where displacement is maximum

  A) I & III only   B) II & IV

  C) II, III & IV   D) I & II

Q.283 A body performing S.H.M, which of the following statements is/are NOT possible

I. Acceleration is maximum at a point where velocity is zero

II. Kinetic energy is maximum at a point where force on body is zero

III. Potential energy is maximum at a point where acceleration is zero

IV. Velocity is zero at a point where acceleration is zero

A) I & III only   B) I, II & IV

C) III &IV   D) II, III & IV

Q.284 During the oscillatory motion Between two extreme points, which of following statements is/are correct:

I. when body moves left or right from equilibrium position its K.E increase at cost of P.E

II. When body at extreme position its total energy is P.E

III. During motion from extreme to equilibrium position K.E increase at cost of P.E

IV. At equilibrium total energy of body is equal to K.E

  A) I & III only   B) II, III

  C) II &IV   D) II, III & IV

Q.285 Which of the following is/are the example of transverse wave:

I. Electromagnetic wave   II. String wave

III. Sound wave   IV. Spring wave

  A) I only   B) II & IV

  C) I & II   D) I, II & III

Q.286 Which of the following is/are longitudinal wave:

I. Sound wave   II. Spring wave

III. Electromagnetic wave   IV. particle wave

A) I & III only   B) II & III only

C) I & II only   D) I, II & III

Q.287 A travelling wave travels in a medium then which of the following statements is/are correct

I. All particles oscillate with same amplitude

II. All particle oscillate with same frequency

III. All particles are in phase

IV. All particle are oscillating with same speed

  A) I & IV   B) I & II

  C) II & III   D) I, II & IV

Q.288 According to law of sonometer, frequency of wave can be increased by:

I. Increasing the length

II. Increasing the tension

III. decreasing the mass per unit length of string

IV. Decreasing the diameter of string

  A) I only   B) II only

  C) II &III   D) II, III &IV

Q.289 For a Standing wave produce in a string which of the following statements is/are correct:
I. Every particle of string vibrates with same amplitude
II. Every particle of string vibrates in SHM.
III. Every particle of string vibrates with same frequency
IV. All particles are stationary

A) I & II
B) II & III
C) IV only
D) II & IV

Q.290 Which of the following is/are usage of Doppler Effect:
I. Tracking a satellite
II. Measuring the speed of vehicle
III. detect the presence of air craft
IV. Motion of Stars

A) I only
B) I & II
C) I, II & III
D) I, II, III & IV

Q.291 Two strings have the same length and fundamental wave length, but different fundamental frequencies. what could account for the difference in the fundamental of two strings:
I. two strings could have different tensions
II. two strings could have different masses
III. the two strings could have different mounting angles

A) I only
B) II only
C) I & II
D) I & III

Q.292 which of following pair include the correct match?
A) Pitch – waveform; Quality – Frequency; loudness - intensity
B) Pitch – Frequency; Quality – Waveform; Loudness – Intensity
C) Pitch – Waveform; Quality – Intensity; Loudness – frequency
D) Pitch – intensity; Quality - waveform; loudness – frequency

Q.293 Consider the following
I. Waves created on the surfaces of a water pond by a vibrating source.
II. Wave created by an oscillating electric field in air.
III. Sound waves travelling under water.
Which of these can be polarized?

A) I and II
B) II only
C) II and III
D) I, II and III

Q.294 The sinusoidal wave from can be varied by using which of the following parameters?
I. Frequency of the carrier wave
II. Amplitude of the carrier wave
III. Phase angle

A. I only
B. I and II only
C. I and III only
D. III only
E. I, II and III

Q.295 If two sounds have the same wavelength in air at the same temperature, what other property must they also have in common?
I. Intensity
II. Amplitude
III. Frequency

A. I only
B. III only
C. I and II only
D. II and III only
E. I, II and III

Q.296 A wave is characterized by which of the following physical concept/s?
I. speed of the wave
II. frequency
III. wave length
A. I only
B. II only
C. III only
D. I and III only
E. I, II and III

Q.297 _____ is defined as the sensation that sound produces in the ear of a listener and is clearly related to the frequency of sound. Frequency and _____ are both measured in Hertz (Hz). Thus, greater the frequency the greater the _____ and lower the frequency lower the _____.
A. Quality ... Pitch ... Loudness ... Pitch
B. Pitch ... Pitch ... Pitch ... Pitch
C. Loudness ... Quality ... Pitch ... Quality
D. Quality ... Quality ... Quality ... Quality
E. Loudness ... Loudness ... Loudness ... Loudness

Q.298 The sinusoidal wave from can be varied by using which of the following parameters?
I. Frequency of the carrier wave
II. Amplitude of the carrier wave
III. Phase angle
A. I only
B. I and II only
C. I and III only
D. III only
E. I, II and III

Q.299 A submarine sends out a sonar signal (sound wave) in a direction directly downward. It takes 2.3 s for the sound wave to travel from the submarine to the ocean bottom and back to the submarine. How high (approx.) up from the ocean floor is the submarine? (The speed of sound in water is 1,490 m/s.)
A. 1,700 m
B. 3,000 m
C. 5,000 m
D. 9,000 m
E. It cannot be determined from the information given

Q.300 The diagram shows the displacements at the same instant of two waves, P and Q, of equal frequency and having amplitude Y and 2Y, respectively.
The waves are superimposed to give a resultant wave. What is the amplitude of the resultant wave and what is the phase difference between the resultant wave and wave P?
Amplitude of (phaser difference between resultant wave

	Amplitude of Resultant wave	(Phase difference between resultant Wave and Wave p)/ radians
A)	Y	0
B)	Y	π
C)	3Y	0
D)	3Y	π

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	D	51	B	101	C	151	C	201	B	251	B
2	C	52	A	102	B	152	B	202	A	252	D
3	C	53	D	103	C	153	D	203	D	253	C
4	D	54	D	104	D	154	B	204	B	254	B
5	D	55	B	105	B	155	A	205	B	255	B
6	D	56	D	106	C	156	B	206	A	256	B
7	A	57	C	107	C	157	C	207	D	257	C
8	C	58	C	108	A	158	B	208	B	258	A
9	B	59	D	109	B	159	B	209	A	259	A
10	C	60	B	110	B	160	B	210	A	260	C
11	B	61	D	111	C	161	C	211	C	261	B
12	D	62	C	112	B	162	A	212	C	262	D
13	D	63	A	113	A	163	D	213	C	263	B
14	B	64	D	114	C	164	C	214	D	264	A
15	C	65	C	115	C	165	B	215	B	265	C
16	A	66	C	116	C	166	B	216	B	266	D
17	C	67	C	117	B	167	C	217	A	267	B
18	B	68	C	118	C	168	D	218	D	268	A
19	A	69	A	119	D	169	C	219	A	269	C
20	D	70	C	120	A	170	D	220	A	270	D
21	A	71	D	121	B	171	B	221	B	271	C
22	A	72	A	122	A	172	D	222	B	272	B
23	A	73	A	123	B	173	A	223	D	273	B
24	A	74	D	124	C	174	A	224	C	274	A
25	A	75	C	125	D	175	A	225	B	275	C
26	C	76	D	126	A	176	A	226	B	276	C
27	D	77	B	127	C	177	C	227	D	277	A
28	B	78	A	128	D	178	A	228	A	278	A
29	A	79	A	129	C	179	B	229	A	279	C
30	B	80	A	130	D	180	A	230	A	280	D
31	C	81	B	131	B	181	B	231	A	281	C
32	D	82	C	132	B	182	D	232	D	282	C
33	A	83	A	133	A	183	A	233	C	283	C
34	C	84	A	134	B	184	C	234	C	284	D
35	B	85	A	135	C	185	C	235	C	285	C
36	C	86	B	136	B	186	A	236	C	286	C
37	B	87	B	137	A	187	A	237	C	287	D
38	D	88	C	138	D	188	B	238	D	288	C
39	A	89	C	139	B	189	B	239	A	289	B
40	B	90	C	140	A	190	B	240	A	290	D
41	A	91	B	141	C	191	D	241	C	291	C
42	B	92	D	142	A	192	A	242	D	292	B
43	B	93	B	143	C	193	D	243	D	293	B
44	C	94	D	144	B	194	A	244	B	294	
45	B	95	A	145	D	195	A	245	B	295	
46	C	96	B	146	C	196	D	246	B	296	
47	C	97	B	147	C	197	C	247	A	297	
48	B	98	D	148	D	198	C	248	C	298	
49	C	99	A	149	A	199	C	249	C	299	A
50	B	100	B	150	B	200	C	250	B	300	B

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