Chapter Test 15	**PARISHRAM PUBLICATIONS PUNE** **NAME of Student : _____** **Subject : Physics** **Class : XI** **Max. Marks :- 180** **Topic : Waves**	

NEET CHAPTER TEST

Marking Scheme:

(i) Each question is allotted 4 (four) marks for each correct response.

(ii) ¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

Q.1 A tube closed at one end and containing air produces, when excited the fundamental note of frequency 512 Hz. If the tube is open at both ends, the fundamental frequency that can be excited is (in Hz)
(1) 1024 (2) 512 (3) 256 (4) 128

Q.2 An air column in pipe, which is closed at one end will be in resonance with a vibrating tuning fork of frequency 264 Hz if the length of the column in cm is
(1) 31.25 (2) 62.50
(3) 110 (4) 125

Q.3 Velocity of sound in air is 320 m/s. A pipe closed at one end has a length of 1 m neglecting end corrections, the air column in the pipe can resonance for sound of frequency.
(a) 80 Hz (b) 240 Hz
(c) 500 Hz (d) 400 Hz
(1) a (2) a,b
(3) a,b,d (4) a,d

Q.4 The velocity of sound in air is 330 m/s the fundamental frequency of an organ pipe open at both ends and length 0.3 metre will be:
(1) 200 Hz (2) 550 Hz
(3) 300 Hz (4) 275 Hz

Q.5 A hollow metallic tube of length L and closed at one end produce resonance with a tuning fork of frequency n. The entire tube is then heated carefully so that at equilibrium temperature its length changes by ℓ. If the change in velocity V of sound is v, the resonance will now be produced by tuning fork of frequency.
(1) (V +v) / [4(L + ℓ)] (2) (V +v) / [4(L - ℓ)]
(3) (V -v) / [4(L + ℓ)] (4) (V -v) / [4(L - ℓ)]

Q.6 When two tuning forks are sounded together x beats/sec are heard frequency of A is n. Now when one prong of B is loaded with a little wax, the number of beats per second decreases the frequency of fork B is :
(1) n + x (2) n – x
(3) $n - x^2$ (4) n – 2x

Q.7 A simple harmonic wave having amplitude A and time period T is represented by the equation y = 5 sinπ (t + 4) metre. The values of A (in meter) and T(in sec.) are
(1) A=5, T=2 (2) A=10, T=1
(2) A=5, T=1 (4) A=10, T=2

Q.8 If at a place the speed of a sound wave of frequency 300 Hz is V, speed of another wave of frequency 150 Hz at the same place will be:
(1) V (2) V/2 (3) 2V (4) 4V

Q.9 The power of sound from the speaker of a radio is 20milli watt by turning the knob of the volume control the power of the sound is increased to 400 milli watt. The power increase in decibels as compared to the original power is :
(1) 13 db (2) 10 db
(3) 20 db (4) 800 db

Q.10 A man standing between two cliffs hears the first echo of a sound after 2 sec. and the second echo 3 sec. after the initial sound. If the speed of sound be 330m/s. The distance between the two cliffs should be:
(1) 1650 m (2) 990 m
(3) 825 m (4) 660 m

Q.11 Stationary waves are produced in 10m long stretched string. If the string vibrates in 5 segments and wave velocity 20m/sec, the frequency is-
(1) 10 Hz (2) 5 Hz
(3) 4 Hz (4) 2Hz

Q.12 A source x of unknown frequency produces 8 beats with a source of 250 Hz and 12 beats with a source of 270 Hz. The frequency of source x is
(1) 258 Hz (2) 242 Hz (3) 262 Hz (4) 282 Hz

Q.13 Two waves of wave length 2 m and 2.02 m respectively moving with the same velocity superimpose to produce 2 beats per sec. The velocity of the wave is:
(1) 400.0 m/s (2) 402 m/s
(3) 404 m/s (4) 406 m/s

Q.14 Sound source of frequency 170 Hz is placed near a wall. A man walking from the source towards the wall finds, that there is periodic rise and fall of sound intensity. If the speed of sound in air is 340 m/s the distance separating the two adjacent portions of minimum intensity is:
(1) (1/2) m (2) (3/2) m
(3) 1 m (4) 2 m

Q.15 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 :
(1) 5 m/s (2) 10 m/s
(3) 20 m/s (4) 40 m/s

Q.16 The disturbance of wave propagating in positive x-direction at t = 0 is $y = \frac{1}{(1+x^2)}$ and at t = 2s it becomes $y = \frac{1}{1+(x-1)^2}$ then the phase velocity of the wave will be
(1) 1/2 m/s (2) 1/4 m/s
(3) 1/6 m/s (4) 1/8 m/s

Q.17 A uniform string of length L and mass M is fixed at both ends under tension T, Then it can vibrate with frequency given by the formula.
(1) $f = \frac{1}{2}\sqrt{\frac{T}{ML}}$ (2) $f = \frac{1}{2L}\sqrt{\frac{T}{M}}$
(3) $f = \frac{1}{2}\sqrt{\frac{T}{M}}$ (4) $f = \frac{1}{2}\sqrt{\frac{M}{LT}}$

Q.18 It the tension in a sonometer wire is increased by a factor of four. The fundamental frequency of vibration changes by a factor of :
(1) 4 (2) (1/4)
(3) 2 (4) (1/2)

Q.19 A stretched wire of length 114 cm is divided into three segment whose frequencies are in the ratio 1 : 3 : 4, the length of the segments must be in the ratio :
(1) 18 : 24 : 72 (2) 24 : 72 : 18
(3) 24 : 18 : 72 (4) 72 : 24 : 18

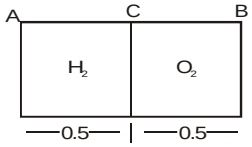
Q.20 The speed of transverse waves in a stretched string is 700 cm/s. It the string is 2 m long, the frequency with which it resonates in fundamental mode is :
(1) (7/2) Hz (2) (7/4) Hz
(3) (14) Hz (4) (2/7) Hz

Q.21 If the velocity of sound in air is 320 m/s the frequency of the fundamental note emitted by a tube of length 1m closed at one end is :
(1) 80 Hz (2) 240 Hz (3) 320 Hz (4) 400 Hz

Q.22 An open pipe is suddenly closed with the result that the second overtone of the closed pipe is found to be higher in frequency by 100 Hz, than the first overtone of the original pipe. The fundamental frequency of open pipe will be :
(1) 100 Hz (2) 300 Hz
(3)150 Hz (4) 200 Hz

Q.23 Frequency of tuning fork A is 256 Hz. It produces four beats/sec. with tuning fork B. When wax is applied at tuning fork B then 6 beats/sec. are heard. Frequency of B is :
(1) 252 (2) 260 Hz
(3) (1) & (2) both (4) 264

Q.24 As shown in fig AB is one metre long cylinder. At the ends A&B and middle point C these are thin flexible diapharm there is H_2 in AC and O_2 filled in part BC. diapharm A & B are oscillated with some frequency when there is antinode at C then ratio of their minimum frequency n_a / n_b will be :

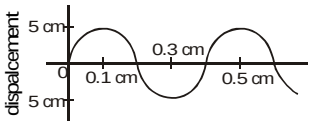


(V_H = 1100 m /sec), V_{O_2} = 300 m/sec
(1) 11/3 (2) 11/7
(3) 9/7 (4) 9/11

Q.25 A wave y = a sin (ωt – kx) on a string meets with another wave producing a node at x = 0. Then the equation of the unknown wave is –
(1) y = a sin (ωt + kx) (2) y = – a sin (ωt + kx)
(3) y = a sin (ωt – kx) (4) y = – a sin (ωt – kx)

Q.26 A somometer wire, with a suspended mass of M = 1 kg., is in resonance with a given tuning fork. The apparatus is taken to moon where the acceleration due to gravity is 1/6 that of earth. To obtain resonance on the moon, the value of M should be
(1) 1 kg. (2) kg
(3) 6 kg (4) 36 kg

Q.27 Figure shows the shape of a part of a long wave produced by attaching one end of string to a tuning fork of frequency 250 Hz. What is the velocity of the waves ?



(1) 1 ms^{-1} (2) 1.5 ms^{-1}
(3) 2.0^{-1} (4) 2.5 ms^{-1}

Q.28 An observer moves towards a stationary source of sound with a velocity one tenth the velocity of sound. The apparent increases in frequency is -
(1) zero (2) 5%
(3) 10% (4) 0.1%

Q.29 A plane progressive wave is represented by the equation y = 0.25 cos (2πt - 2πx). The equation of a wave with double the amplitude and half frequency but travelling in the opposite direction will be.
(1) y = 0.5 cos (πt - πx) (2) y = 0.5 cos (2πt + 2πx)
(3) y = 0.25 cos (πt + 2πx) (4) y = 0.5 cos (πt + πx)

Q.30 A, B and C are three tuning forks the frequency of A is 350 Hz. A and B produce 5 beats/sec. While B and C produce 4 beats/sec. When A is loaded with wax it produces 2 beats/s with B, and 6 beats/s with C. The frequency of B & C is-
(1) 341 Hz, 359 Hz (2) 345 Hz, 341 Hz
(3) 359 Hz, 345 Hz (4) 355 Hz, 341 Hz

Q.31 A closed organ pipe of length 1.5 m with some gas vibrate in its fundamental mode. Another open organ pipe of same length but filled with air, resonates with the same fork in its fundamental mode if the temperature of the room be 30°C and the speed of sound in air at 30°C be 360 m/s the speed of sound in the gas at 0°C is:
(1) 637 m/s (2) 683 m/s
(3) 341.5 m/s (4) 318 m/s

Q.32 A wave y = 10 sin (ax + bt) is reflected from a dense medium at an origin. If 81% of energy is reflected then the equation of reflected wave is:
(1) y = –8.1 sin (ax – bt) (2) y = 8.1 sin (ax + bt)
(3) y = –9 sin (bt – ax) (4) y = 10 sin (ax – bt)

Q.33 A progressive wave of frequency 500 Hz is travelling with a velocity of 360 m/sec. How far apart are two point, which have difference of 120° phase
(1) 0.12 m (2) 0.24 m
(3) 0.18 m (4) 0.26 m

Q.34 A steel wire of length 1m, mass 0.1 kg and uniform cross sectional area 10^{-6} m^2 is rigidly fixed at both ends. The temperature difference of wire is 20°C. If the transverse waves are set up by plucking the string in the middle calculate frequency of fundamental mode of vibration.
($Y = 2 \times 10^{11}$ N/m^2 , $\alpha = 1.21 \times 10^{-5}$ /°c)
(1) 11 Hz (2) 20 Hz
(3) 22 Hz (4) 15Hz

Q.35 A string under a tension of 129.6 N produces 10 beats /sec when it is vibrated along with a tuning fork. When the tension is the string is increased to 160N. it sounds in unison with same tuning fork. calculate fundamental frequency of tuning fork.
(1) 100 Hz (2) 50 Hz
(3) 150 Hz (4) 200 Hz

Q.36 For a certain organ pipe three successive resonable frequencies are observed at 425, 595 and 765 Hz respectively taking the speed of sound in air to be 340m/sec (i) whether the pipe is closed end or open end (ii) determine the length of pipe.
(1) closed end, 1 m (2) open end, 1 m
(3) closed end, 2m (4) open end, 1 m

Q.37 An under water swimmer sends a sound signal to the surface. It is produces 5 beats/sec when compared with fundamental tone of a pipe of 20 cm length closed at one end what is wavelength of sound in water. (take V_{water} = 1500 m/sec V_{air} = 360m/sec)
(1) 3.3 m or 3.37 m (2) 4.4 m or 4.47 m
(3) 2.5 m or 2.7 m (4) 1m or 1.7 m

Q.38 A person observes a change of 2.5% in frequency of sound of horn of a car. If the car is approaching forward the person & sound velocity is 320 m/sec., then velocity of car in m/sec will be approximately.
(1) 8 (2) 800 (3) 7 (4) 6

Q.39 A source of sound of frequency 1000 Hz is moving with a uniform velocity 20 m/s. The ratio of apparent frequency heard by the observer before and after the source crosses him would be: [Speed of sound = 340 m/s]
(1) 9 : 8 (2) 8 : 9
(3) 1 : 1 (4) 9 : 10

Q.40 Two sound sources (of same frequency) are placed at distance of 100 meter. An observer when moving between both sources hears 4 beats per second. The distance between sound source is now changed to 400meter then the beats/second heard by observer will be:
(1) 2 (2) 4
(3) 8 (4) 16

Q.41 A sound source is moving towards a stationary listener with $(1/10)^{th}$ of the speed of sound. The ratio of apparent to real frequency is :
(1) $\frac{11}{10}$ (2) $\left(\frac{11}{10}\right)^2$
(3) $\left(\frac{9}{10}\right)^2$ (4) $\frac{10}{9}$

Q.42 A railway engine moving with a speed of 60m/sec passes in front of a stationary listener. The real frequency of whistle is 400 Hz. Calculate the apparent frequency heared by listener (a) when the engine is approaching the listener. (b) when the engine moving away from the listener
(V = 340 m/s)
(1) 485.7 Hz, 340 Hz (2) 220 Hz, 180 Hz
(3) 320 Hz,155 Hz (4) 400 Hz, 330 Hz

Q.43 A sound source in moving with speed 5 m/s towards a wall. If the velocity of sound in 330 m/s the stationary observer would hear beats is equal to (frequency of source = 240 Hz)
(1) 0 (2) 0 or 8
(3) 8 (4) 0 or 4

Q.44 Doppler effect for sound depends upon the relative motion of source and listener and it also depends upon that which one of these is in motion. whereas in Doppler effect for light it only depends upon the relative motion of the source of sound and observer. The reason for It is :
(1) Einstein's mass energy relation
(2) Einstein's theory of relativity
(3) Photo electric effect
(4) none of above

Q.45 A source of sound of frequency 90 vibrations/sec is approaching a stationary observer with a speed equal to 1/10 the speed of sound. What will be the frequency heard by the observer ?
(1) 80 vibrations/sec (2) 90 vibrations/sec
(3) 100 vibrations/sec (4) 120 vibrations/sec