

PYQSide

NEET WAVES — STANDING WAVES AND NORMAL MODES (STRINGS, ORGAN PIPES) — PYQS

Max. Marks: 72

Questions: 18

Section A (MCQ)

Q.1 For sound waves, if the number of nodes for the 5th harmonic of an open-ended pipe is n and that for the 9th harmonic of the same pipe with one of its ends closed is m , the ratio $\frac{n}{m}$ is

[RE-NEET (UG) 2026]

- (1) $\frac{3}{5}$ (2) $\frac{5}{9}$ (3) $\frac{9}{5}$ (4) 1

Scan or tap for the full solution



Q.2 A pipe open at both ends has a fundamental frequency f in air. The pipe is now dipped vertically in a water drum to half of its length. The fundamental frequency of the air column is now equal to:

[NEET (UG) 2025]

- (1) $\frac{3f}{2}$ (2) $2f$ (3) $\frac{f}{2}$ (4) f

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Q.3 The ratio of frequencies of fundamental harmonic produced by an open pipe to that of closed pipe having the same length is

[NEET (UG) 2023]

- (1) 2:1 (2) 1:3 (3) 3:1 (4) 1:2

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Q.4 An organ pipe filled with a gas at 27°C resonates at 400 Hz in its fundamental mode. If it is filled with the same gas at 90°C, the resonance frequency at the same mode will be

[NEET (UG) 2022 (Phase 2)]

- (1) 512 Hz (2) 420 Hz (3) 440 Hz (4) 484 Hz

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Q.5 A tuning fork is used to produce resonance in a glass tube. The length of the air column in this tube can be adjusted by a variable piston. At room temperature of 27°C two successive resonances are produced at 20 cm and 73 cm of column length. If the frequency of the tuning fork is 320 Hz, the velocity of sound in air at 27°C is

[NEET 2018]

(1) 330 m s⁻¹(2) 339 m s⁻¹(3) 350 m s⁻¹(4) 300 m s⁻¹

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Q.6 The fundamental frequency in an open organ pipe is equal to the third harmonic of a closed organ pipe. If the length of the closed organ pipe is 20 cm, the length of the open organ pipe is

[NEET 2018]

- (1) 13.2 cm (2) 8 cm (3) 12.5 cm (4) 16 cm

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Q.7 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?

[NEET 2017]

- (1) 20 Hz (2) 30 Hz (3) 40 Hz (4) 10 Hz

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Q.8 An air column, closed at one end 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 is

[NEET 2016 (Phase 1)]

- (1) 150 cm (2) 200 cm (3) 66.7 cm (4) 100 cm

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Q.9 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

[NEET 2016 (Phase 2)]

- (1) L (2) $2L$ (3) $\frac{L}{2}$ (4) $4L$

Scan or tap for the full solution



Q.10 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

[AIPMT 2015]

- (1) 10.5 Hz (2) 105 Hz (3) 155 Hz (4) 205 Hz

Scan or tap for the full solution



- Q.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 [AIPMT 2015]
 (1) 120 cm (2) 140 cm (3) 80 cm (4) 100 cm

Scan or tap for the full solution



- Q.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 [AIPMT 2014]

- (1) $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$
 (2) $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}}$
 (3) $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$
 (4) $n = n_1 + n_2 + n_3$

Scan or tap for the full solution



- Q.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}) [AIPMT 2014]
 (1) 4 (2) 5 (3) 7 (4) 6

Scan or tap for the full solution



- Q.14** If we study the vibration of a pipe open at both ends, then the following statement is not true.

[NEET 2013]

- (1) All harmonics of the fundamental frequency will be generated.
 (2) Pressure change will be maximum at both ends.
 (3) Open end will be antinode.
 (4) Odd harmonics of the fundamental frequency will be generated.

Scan or tap for the full solution



- Q.15** 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.

[NEET 2013 (Karnataka)]

- (1) $\frac{1500}{23}$ cm, $\frac{500}{23}$ cm (2) $\frac{1500}{23}$ cm, $\frac{300}{23}$ cm
 (3) $\frac{300}{23}$ cm, $\frac{1500}{23}$ cm (4) $\frac{1500}{23}$ cm, $\frac{2000}{23}$ cm

Scan or tap for the full solution



- Q.16** When a string is divided into three segments of lengths l_1 , l_2 and l_3 , the fundamental frequencies of these three segments are v_1 , v_2 and v_3 respectively. The original fundamental frequency (v) of the string is [AIPMT 2012 (Prelims)]

- (1) $\sqrt{v} = \sqrt{v_1} + \sqrt{v_2} + \sqrt{v_3}$
 (2) $v = v_1 + v_2 + v_3$
 (3) $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2} + \frac{1}{v_3}$
 (4) $\frac{1}{\sqrt{v}} = \frac{1}{\sqrt{v_1}} + \frac{1}{\sqrt{v_2}} + \frac{1}{\sqrt{v_3}}$

Scan or tap for the full solution



- Q.17** If the tension and diameter of a sonometer wire of fundamental frequency n is doubled and density is halved then its fundamental frequency will become

[AIPMT 2001]

- (1) $\frac{n}{4}$ (2) $\sqrt{2}n$ (3) n (4) $\frac{n}{\sqrt{2}}$

Scan or tap for the full solution



- Q.18** A string is cut into three parts, having fundamental frequencies n_1 , n_2 , n_3 respectively. Then original fundamental frequency n related by the expression as [AIPMT 2000]

- (1) $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$ (2) $n = n_1 \times n_2 \times n_3$
 (3) $n = n_1 + n_2 + n_3$ (4) $n = \frac{n_1 + n_2 + n_3}{3}$

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	4	4	1	3	2	1	1	1	2	2	1
Ques.	12	13	14	15	16	17	18				
Ans.	1	4	2	4	3	3	1				