

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

Max. Marks: 40

Questions: 10

Section A (MCQ) — 6 questions

- Q.1** The fifth harmonic of a closed organ pipe is found to be in unison with the first harmonic of an open pipe. The ratio of lengths of closed pipe to that of the open pipe is $5/x$. The value of x is _____

[JEE Main 2026 (Online) 24th January Evening Shift]

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

 Scan or tap for the
full solution


- Q.2** In an open organ pipe v_3 and v_6 are 3rd and 6th harmonic frequencies, respectively. If $v_6 - v_3 = 2200$ Hz then length of the pipe is _____ mm.

(Take velocity of sound in air is 330 m/s.)

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) 200 (2) 225 (3) 275 (4) 250

 Scan or tap for the
full solution


- Q.3** In an experiment with a closed organ pipe, it is filled with water by $\left(\frac{1}{5}\right)$ th of its volume. The frequency of the fundamental note will change by _____

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) 20% (2) 25% (3) -20% (4) -25%

 Scan or tap for the
full solution


- Q.4** In the resonance experiment, two air columns (closed at one end) of 100 cm and 120 cm long, give 15 beats per second when each one is sounding in the respective fundamental modes. The velocity of sound in the air column is:

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 370 m/s (2) 340 m/s
(3) 335 m/s (4) 360 m/s

 Scan or tap for the
full solution


- Q.5** A closed organ and an open organ tube are filled by two different gases having same bulk modulus but different densities ρ_1 and ρ_2 , respectively. The frequency of 9th harmonic of closed tube is identical with 4th harmonic of open tube. If the length of the closed tube is 10 cm and the density ratio of the gases is $\rho_1:\rho_2 = 1:16$, then the length of the open tube is :

[JEE Main 2025 (Online) 22nd January Morning Shift]

- (1) $\frac{15}{7}$ cm (2) $\frac{20}{9}$ cm
(3) $\frac{20}{7}$ cm (4) $\frac{15}{9}$ cm

 Scan or tap for the
full solution


- Q.6** The fundamental frequency of a closed organ pipe is equal to the first overtone frequency of an open organ pipe. If length of the open pipe is 60 cm, the length of the closed pipe will be:

[JEE Main 2024 (Online) 31st January Morning Shift]

- (1) 15 cm (2) 60 cm (3) 45 cm (4) 30 cm

 Scan or tap for the
full solution


Section B (Numerical) — 4 questions

- Q.7** A closed and an open organ pipe have same lengths. If the ratio of frequencies of their seventh overtones is $\left(\frac{a-1}{a}\right)$ then the value of a is _____.

[JEE Main 2024 (Online) 8th April Morning Shift]

 Scan or tap for the
full solution


- Q.8** Two open organ pipes of lengths 60 cm and 90 cm resonate at 6th and 5th harmonics respectively. The difference of frequencies for the given modes is _____ Hz. (Velocity of sound in air = 333 m/s)

[JEE Main 2024 (Online) 6th April Evening Shift]

 Scan or tap for the
full solution


- Q.9** A sonometer wire of resonating length 90 cm has a fundamental frequency of 400 Hz when kept under some tension. The resonating length of the wire with fundamental frequency of 600 Hz under same tension _____ cm.

[JEE Main 2024 (Online) 5th April Evening Shift]

Scan or tap for the
full solution



- Q.10** In a closed organ pipe, the frequency of fundamental note is 30 Hz. A certain amount of water is now poured in the organ pipe so that the fundamental frequency is increased to 110 Hz. If the organ pipe has a cross-sectional area of 2 cm^2 , the amount of water poured in the organ tube is _____ g. (Take speed of sound in air is 330 m/s)

[JEE Main 2024 (Online) 30th January Morning Shift]

Scan or tap for the
full solution



ANSWER KEY

Section A (MCQ) — 6 questions

Ques.	1	2	3	4	5	6					
Ans.	2	2	2	4	2	1					

Section B (Numerical) — 4 questions

Ques.	7	8	9	10			
Ans.	16	740	60	400			