

JEE MAIN KINETIC THEORY — MOLECULAR NATURE OF MATTER, BEHAVIOUR OF GASES — PYQS

Max. Marks: 40

Questions: 10

Section A (MCQ) — 8 questions

- Q.1** Two closed vessels of same volume are joined through a narrow tube and both vessels are filled with air of pressure 90 kPa and temperature 400 K. Keeping the temperature of one vessel constant at 400 K the second vessel temperature is raised to 500 K. The final pressure in the vessels is _____ kPa.

[JEE Main 2026 (Online) 6th April Morning Shift]

- (1) 100 (2) 120 (3) 90 (4) 105

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- Q.2** An ideal gas at pressure P and temperature T is expanding such that $PT^3 = \text{constant}$. The coefficient of volume expansion of the gas is _____.

[JEE Main 2026 (Online) 5th April Evening Shift]

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

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- Q.3** One gas of n_1 mole of molecules at temperature T_1 , volume V_1 , and pressure P_1 , and another gas of n_2 mole of molecules at temperature T_2 , volume V_2 , and pressure P_2 , are mixed resulting in pressure P and volume V of the mixture. The temperature of the mixture is _____.

[JEE Main 2026 (Online) 4th April Morning Shift]

- (1) $\frac{(T_1 + T_2)}{2}$
 (2) $\frac{T_1 T_2 P V}{T_2 P_1 V_1 + T_1 P_2 V_2}$
 (3) $\frac{(T_2 P_1 V_1 + T_1 P_2 V_2)}{T_1 T_2 P V}$
 (4) $\frac{|T_1 - T_2|}{2}$

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- Q.4** A mixture of carbon dioxide and oxygen has volume 8310 cm^3 , temperature 300 K, pressure 100 kPa and mass 13.2 g. The number of moles of carbon dioxide and oxygen gases in the mixture respectively are _____.
 (Assume both carbon dioxide and oxygen gases behave like ideal gases) [$R = 8.31 \text{ J/mol K}$]

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 0.15 and 0.18 (2) 0.25 and 0.08
 (3) 0.21 and 0.12 (4) 0.13 and 0.20

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- Q.5** There are two vessels filled with an ideal gas where volume of one is double the volume of the other. The large vessel contains the gas at 8 kPa at 1000 K while the smaller vessel contains the gas at 7 kPa at 500 K. If the vessels are connected to each other by a thin tube allowing the gas to flow and the temperature of both vessels is maintained at 600 K, at steady state the pressure in the vessels will be (in kPa).

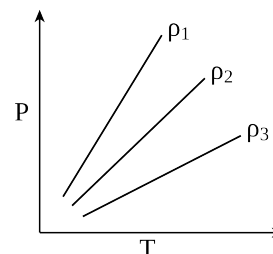
[JEE Main 2025 (Online) 4th April Evening Shift]

- (1) 24 (2) 4.4 (3) 18 (4) 6

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- Q.6** P-T diagram of an ideal gas having three different densities ρ_1, ρ_2, ρ_3 (in three different cases) is shown in the figure. Which of the following is correct :

[JEE Main 2024 (Online) 4th April Morning Shift]



- (1) $\rho_1 > \rho_2$ (2) $\rho_2 < \rho_3$
 (3) $\rho_1 = \rho_2 = \rho_3$ (4) $\rho_1 < \rho_2$

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- Q.7** Two vessels A and B are of the same size and are at same temperature. A contains 1 g of hydrogen and B contains 1 g of oxygen. P_A and P_B are the pressures of the gases in A and B respectively, then $\frac{P_A}{P_B}$ is:

[JEE Main 2024 (Online) 29th January Morning Shift]

- (1) 4 (2) 32 (3) 8 (4) 16

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- Q.8** The temperature of a gas having 2.0×10^{25} molecules per cubic meter at 1.38 atm (Given, $k = 1.38 \times 10^{-23} \text{ J K}^{-1}$) is :

[JEE Main 2024 (Online) 29th January Evening Shift]

(1) 500 K (2) 300 K (3) 200 K (4) 100 K

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Section B (Numerical) — 2 questions

- Q.9** An insulated cylinder of volume 60 cm^3 is filled with a gas at 27°C and 2 atmospheric pressure. Then the gas is compressed making the final volume as 20 cm^3 while allowing the temperature to rise to 77°C . The final pressure is _____ atmospheric pressure.

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

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- Q.10** A container of fixed volume contains a gas at 27°C . To double the pressure of the gas, the temperature of gas should be raised to _____ $^\circ\text{C}$.

[JEE Main 2025 (Online) 29th January Morning Shift]

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ANSWER KEY

Section A (MCQ) — 8 questions

Ques.	1	2	3	4	5	6	7	8			
Ans.	1	3	2	3	4	1	4	1			

Section B (Numerical) — 2 questions

Ques.	9	10					
Ans.	7	327					