PHYSICS

NEET

CRASH COURSE

KTG & THERMODYNAMICS

SMART ACHIEVERS

JEE | NEET | FOUNDATION

KTG & THERMODYNAMICS

Q.1 Which of the following quantities is zero on an average for the molecules of an ideal gas in equilibrium ?
(1) kinetic energy   (2) momentum   (3) density   (4) speed

Q.2 Fig. shows graphs of pressure vs density for an ideal gas at two temperatures T_1 and T_2.

(1) $T_1 > T_2$ (2) $T_1 = T_2$
(3) $T_1 < T_2$ (4) any of the three is possible

Q.3 The ratio of the mean speed of hydrogen molecules to the mean speed of nitrogen molecules in a sample containing a mixture of the two gases.

(1) $\sqrt{14}$ (2) $\sqrt{7}$ (3) $\sqrt{28}$ (4) None of these

Q.4 The pressure of an ideal gas is written as $P = \dfrac{2E}{3V}$. Here E refers to

(1) translatioal kinetic energy   (2) rotational kinetic energy
(3) vibrational kinetic energy   (4) total kinetic energy.

Q.5 Refer to fig. Let ΔU_1 and ΔU_2 be the changes in internal energy of the system in the processes A and B then
(1) $\Delta U_1 > \Delta U_2$ (2) $\Delta U_1 = \Delta U_2$ (3) $\Delta U_1 < \Delta U_2$ (4) $\Delta U_1 \neq \Delta U_2$

Q.6 In the following figures (1) to (4), variation of volume by change of pressure is shown. A gas is taken along the path ABCDA. The change in internal energy of the gas will be:

(1) positive in all cases from (1) to (4)
(2) positive in cases (1), (2) and (3) but zero in case (4)
(3) negative in cases (1), (2) and (3) but zero in case (4)
(4) zero in all the four cases.

Q.7 The process $\Delta U = 0$, for an ideal gas can be best represented in the form of a graph :

Q.8   In the following V-T diagram what is the relation between P_1 and P_2 :
(1) $P_2 = P_1$
(2) $P_2 > P_1$
(3) $P_2 < P_1$
(4) cannot be predicted
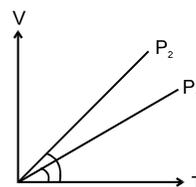
Q.9   Ideal gas is taken through process shown in figure:
(1)   In process AB, work done by system is positive
(2)   In process AB, heat is rejected out of the system.
(3)   In process AB, internal energy increases
(4)   In process AB internal energy decreases and in process BC internal energy increases.
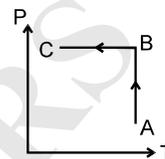
Q.10   When an ideal diatomic gas is heated at constant pressure , the fraction of the heat energy supplied which increases the internal energy of the gas is .

(1) $\dfrac{2}{5}$ (2) $\dfrac{3}{5}$ (3) $\dfrac{3}{7}$ (4) $\dfrac{5}{7}$

Q.11   Boiling water is changing into steam. Under this condition, the specific heat of water is
(1) zero   (2) one   (3) Infinite   (4) less than one

Q.12   Supposing the distance between the atoms of a diatomic gas to be constant, its specific heat at constant volume per mole (gram mole) is

(1) $\dfrac{5}{2}R$ (2) $\dfrac{3}{2}R$ (3) R   (4) $\dfrac{7}{2}R$

Q.13   A Carnot engine works between 600 K and 300 K. In each cycle of operations, the engine draws 1000joule of energy from the source at 600 K. The efficiency of the engine is -
(1) 20%   (2) 50%   (3) 70%   (4) 90%

Q.14   A Carnot working between 300K and 600K has work output of 800 J per cycle. What is amount of heat energy supplied to the engine form source per cycle
(1) 1800 J/cycle   (2) 1000 J/cycle   (3) 2000 J/cycle   (4) 1600 J/cycle

Q.15   If the door of a refrigerator is kept open then which of the following is ture
(1) Room is cooled   (2) Room is heated
(3) Room is either cooled or heated   (4) Room is neither cooled nor heated

Q.16   A scientist says that the efficiency of his heat engine which operates at source temperature 127°C and sink temperature 27° C is 26% then
(1) It is impossible   (2) It is possible but less probable
(3) It is quite probable   (4) Data are incomplete

Q.17   At constant pressure hydrogen is having temperature of 327^0 C . Till what temperature it is to be cooled so that the rms velocity of its molecules becomes half of the earlier value :-
(1) -123^0 C   (2) 123^0 C   (3) -100^0 C   (4) 0^0C

Q.18   Two containers A and B contain molecular gas at same temperature with mases of melecules are m_A and m_B, then relation of momentum P_A and P_B will be-

(1) $P_A = P_B$ (2) $P_A = \left(\dfrac{m_A}{m_B}\right)^{1/2} P_B$ (3) $P_A = \left(\dfrac{m_B}{m_A}\right)^{1/2} P_B$ (4) $P_A = \left(\dfrac{m_A}{m_B}\right) P_B$

Q.19 **Assertion :** The average kinetic energy of the molecules in one mole of all ideal gasses, at the same temperature is the same.

Reason : The average kinetic energy of one mole of any ideal gas is given by $E = 1/2RT$

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

Q.20 **Assertion :** The adiabatic exponent of a mixture of a gases can be obtained as $\gamma_{mix} = \dfrac{n_1 \gamma_1 + n_2 \gamma_2}{n_1 + n_2}$.

Reason : For a gas mixture $(C_V)_{mix} = \dfrac{n_1 C_{V_1} + n_2 C_{V_2}}{n_2 + n_2}$ and $(C_P)_{mix} = \dfrac{n_1 C_{P_1} + n_2 C_{P_2}}{n_1 + n_2}$ and $\gamma_{mix} = \left(\dfrac{C_P}{C_V}\right)_{mix}$

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

Q.21 A body of mass 5 kg falls from a height of 30 metre. If its all mechanical energy is changed into heat, then heat produced will be:-

(1) 350 cal   (2) 150 cal   (3) 60 cal   (4) 6 cal

Q.22 For an adiabatic expansion of a perfect gas, the value of $\Delta P/P$ is equal to:-

(1) $-\sqrt{\gamma}\ \Delta V/V$ (2) $-\Delta V/V$ (3) $-\gamma\ \Delta V/V$ (4) $-\gamma^2\ \Delta V/V$

Q.23 Find the approx. number of molecules contained in a vessel of volume 7 litres at 0°C at 1.3×10^5 pascal

(1) 2.4×10^{23} (2) 3×10^{23} (3) 6×10^{23} (4) 4.8×10^{23}

Q.24 A rigid tank contains 35 kg of nitrogen at 6 atm. Sufficient quantity of oxygen is supplied to increase the pressure to 9 atm, while the temperature remains constant. Amount of oxygen supplied to the tank is :

(1) 5 kg   (2) 10 kg   (3) 20 kg   (4) 40 kg

Q.25 When 2 gms of a gas are introduced into an evacuated flask kept at 25^0C, the pressure is found to be one atmosphere. If 3 gms of another gas added to the same flask the pressure becomes 1.5 atmospheres. The ratio of the molecular weights of these gases will be

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

Q.26 The ratio of average translational kinetic energy to rotational kinetic energy of a diatomic molecule at temperature T is

(1) 3   (2) 7/5   (3) 5/3   (4) 3/2

Q.27 One mole of an ideal gas at STP is heated in an insulated closed container until the average speed of its molecules is doubled. Its pressure would therefore increase by factor.

(1) 1.5   (2) $\sqrt{2}$ (3) 2   (4) 4

Q.28 If the rms speed of the nitrogen molecules of the gas at room temperature is 500 m/s, then the rms speed of the hydrogen molecules at the same temperature will be -

(1) 1870 m/s   (2) 1935 m/s   (3) 7000 m/s   (4) 83.7 m/s

Q.29 The rms velocity of molecules of a gas at temperature T is v_{rms}. Then the root mean square of the component of velocity in any one particular direction will be -

(1) $v_{rms}/\sqrt{3}$ (2) $\sqrt{3}\ v_{rms}$ (3) $v_{rms}/3$ (4) $3v_{rms}$

Q.30 The temperature of an ideal gas is increased from 27ºC to 927ºC. The rms speed of its molecules becomes -

(1) Twice   (2) Half   (3) Four times   (4) One fourth

Q.31 The molecules of a given mass of a gas have r.m.s. velocity of 200 m/sec. at 27°C and 1×10^5 N/m² pressure. When the temperature is 127°C and pressure 1.5×10^5 n/m² the r.m.s. velocity in m/sec is :

(1) $\dfrac{(100\sqrt{2})}{3}$ (2) $100\sqrt{2}$ (3) $400\sqrt{3}$ (4) None of these

Q.32 A sample of gas is at 0°C. The temperature at which its rms speed of the molecules will be doubled is -
(1) 103°C   (2) 273°C   (3) 723°C   (4) 819°C

Q.33 At 0°C temperature root mean square speed of which of the following gases be maximum -
(1) H_2 (2) N_2 (3) O_2 (4) SO_2

Q.34 N_2 molecule is 14 times heavier than a H_2 molecule. At what temperature will the rms speed of H_2 molecules be equal to that of N_2 molecule at 27°C -
(1) 50°C   (2) 2°C   (3) 21.4°C   (4) 21.4 K

Q.35 In a cubical box of volume V, there are N molecules of a gas moving randomly. If m is mass of each molecule and v^2 is the mean square of x component of the velocity of molecules, then the pressure of the gas is -

(1) $P = \dfrac{1}{3}\dfrac{mNv^2}{V}$ (2) $P = \dfrac{mNv^2}{V}$ (3) $P = \dfrac{1}{3}mNv^2$ (4) $P = mNv^2$

Q.36 Two containers are of equal volume. One contains O_2 while the other has H_2. Both are kept at same temperature. The ratio of their pressure will be (rms velocity of these gases have ratio as 1 : 4) for 1 mole of each gas -
(1) 1 : 1   (2) 1 : 4   (3) 1 : 8   (4) 1 : 2

Q.37 Degree of freedom of a monoatomic gas due to its rotational motion will be -
(1) 3   (2) 5   (3) 0   (4) 6

Q.38 Mean translational kinetic energy of each degree of freedom of one molecule of a gas will be -
(1) RT/2   (2) kT/2   (3) 3RT/2   (4) 3RT/2

Q.39 The value of rotational K.E. at temperature T of one mole molecule of a diatomic gas will be -
(1) RT   (2) 3RT/2   (3) 5RT   (4) RT/2

Q.40 CO_2 is linear triatomic molecule. The average K.E. at temperature T will be -
(1) 3kT/2   (2) 5kT/2   (3) 6kT/2   (4) 7kT/2

Q.41 n molecules of an ideal gas are enclosed in cubical box at temperature T and pressure P. If the number of molecules in the box is trippled then new temperature and pressure become T′ and P′ respectively, but the total energy of gas system remains unchanged, then -
(1) P = P′ and T = T′   (2) P = 3P′ and T′ = 1/3 T
(3) P′ = 3P and T′ = T   (4) P′ = P and T′ = T/3

Q.42 8 gm O_2, 14gm N_2 and 22gm CO_2 is mixed in a container of 10 litre capacity at 27° C. The pressure exerted by the mixture in terms of atmospheric pressure will be -
(1) 1   (2) 3   (3) 9   (4) 18

Q.43 Real gas behaves like an ideal gas at -
(1) High temperature
(2) Low pressure
(3) High temperature and low pressure
(4) Low temperature and high pressure

Q.44 The unit of a × b in Vander waal's equation is -
(1) N/m^2
(2) $N-m^7$
(3) $N-m^4$
(4) N/m^3

Q.45 What is heat :
(1) Kinetic energy of molecules
(2) Potential and kinetic energy of molecules
(3) Energy in transit
(4) Work done on the system

Q.46 An ideal gas follows a process PT = constant. The correct graph between pressure & volume is

(1)   (2)   (3)   (4)
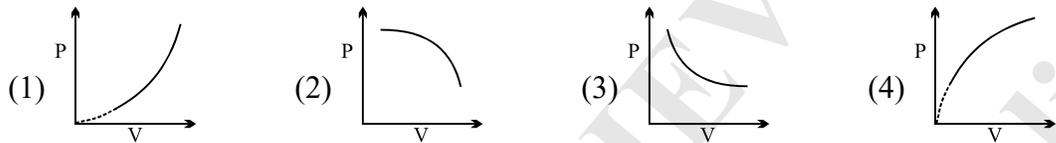
Q.47 The expansion of an ideal gas of mass m at a constant pressure P is given by the straight line B. Then the expansion of the same ideal gas of mass 2 m at a pressure 2P is given by the straight line
(1) C
(2) A
(3) B
(4) none
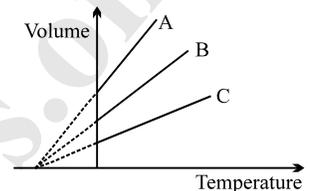
Q.48 A given mass of a gas expands from a state A to the state B by three paths 1, 2 and 3 as shown in T-V indicator diagram. If W_1, W_2 and W_3 respectively be the work done by the gas along the three paths, then
(1) $W_1 > W_2 > W_3$
(2) $W_1 < W_2 < W_3$
(3) $W_1 = W_2 = W_3$
(4) $W_1 < W_2$, $W_1 > W_3$
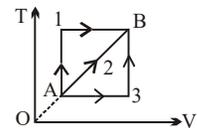
Q.49 Pressure versus temperature graph of an ideal gas is shown in figure
(1) During the process AB work done by the gas is positive
(2) during the process CD work done by the gas is negative
(3) during the process BC internal energy of the gas is increasing
(4) None
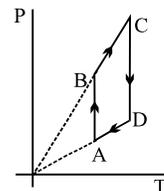
Q.50 One mole of an ideal gas is contained with in a cylinder by a frictionless piston and is initially at temperature T. The pressure of the gas is kept constant while it is heated and its volume doubles. If R is molar gas constant, the work done by the gas in increasing its volume is
(1) RT $ln2$
(2) 1/2 RT
(3) RT
(4) 3/2 RT

Q.51 A polyatomic gas with six degrees of freedom does 25J of work when it is expanded at constant pressure. The heat given to the gas is
(1) 100J
(2) 150J
(3) 200J
(4) 250J

Q.52 The first law of thermodynamics can be written as $\Delta U = \Delta Q + \Delta W$ for an ideal gas. Which of the following statements is correct?

(1) ΔU is always zero when no heat enters or leaves the gas

(2) ΔW is the work done by the gas in this written law.

(3) ΔU is zero when heat is supplied and the temperature stays constant

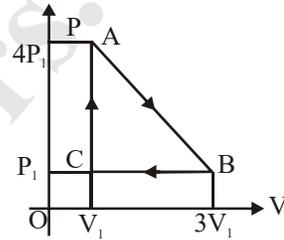(4) $\Delta Q = -\Delta W$ when the temperature increases very slowly.

Q.53 An ideal monoatomic gas is taken round the cycle ABCDA as shown P-V diagram. The work-done during the cycle is :

(1) PV

(2) 2 PV

(3) PV/2

(4) zero
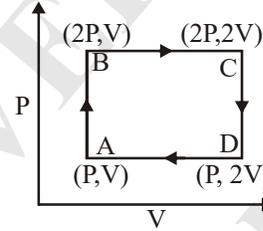
Q.54 An ideal gas is taken through series of changes ABCA. The amount of work involved in the cycle is :

(1) $12P_1V_1$

(2) $6P_1V_1$
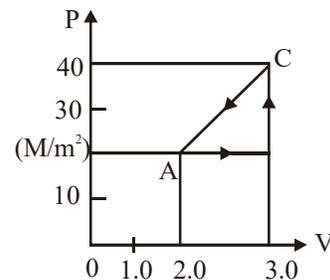
(3) $3P_1V_1$

(4) P_1V_1

Q.55 An ideal system can be brought from stage A to B through four paths as shown in the figure. The energy given to the system is minimum is :
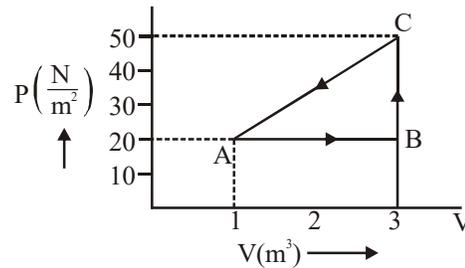
(1) path ACB

(2) path ADB

(3) path AEB

(4) path AFB
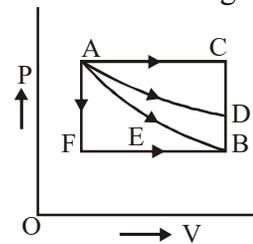
Q.56 In the indicator diagram shown the work done along path AB is :

(1) Zero

(2) 20 Joule

(3) – 20 Joule

(4) 60 Joule

Q.57 In the diagram, the graph between volume and pressure for a thermodynamical process is shown. If $U_A = 0$, $U_B = 20$ J and the energy given from B to C is 30 J, then at the stage of C, the internal energy of the system is :

(1) 50 J   (2) 60 J   (3) 30 J   (4) 10 J

Q.58 Four curves A, B, C and D are drawn in the figure for a given amount of a gas. The curves representing adiabatic and isothermal process are :

(1) C and D respectively   (2) D and C respectively

(3) A and B respectively   (4) B and A respectively
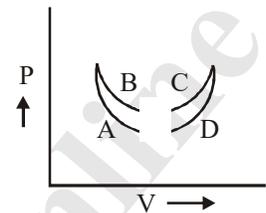
Q.59 During the adiabatic change of ideal gas, the relation between the pressure and the density will be:

(1) $\dfrac{P_1}{P_2} = \left(\dfrac{d_2}{d_1}\right)^{1/\gamma}$ (2) $P_1 d^{\gamma}_1 = P_2 d_2{}^{\gamma}$

(3) $P_1 d_1{}^{-\gamma} = P_2 d_2{}^{-\gamma}$ (4) $\dfrac{P_1}{P_2} = \left(\dfrac{d_1}{d_2}\right)^{1/\gamma}$

Q.60 The increase in temperature of a gas under isothermal compression is T_i. If the gas is compressed adiabatically, the increase in temperature is T_a. This implies :

(1) $T_i = T_a$ (2) $T_i = 0$ (3) $T_a = 0$ (4) $T_a < T_i$

Q.61 The amount of work done in isothermal process by one gm mole is :

(1) $RT \log_{10}(V_1/V_1)$ (2) $RT \log_{10}(V_1/V_2)$ (3) $RT \log_e(V_2/V_1)$ (4) $RT \log_e(V_1/V_2)$

Q.62 A Carnot's engine working between 27°C and 127°C takes up 800 J of heat from the reservoir in one cycle. What is the work done by the engine ?

(1) 100 J   (2) 200 J   (3) 300 J   (4) 400 J

Q.63 In Q.54, how much heat is rejected to the sink ?

(1) 600 J   (2) 500 J   (3) 400 J   (4) 300 J

Q.64 In Q.54, what is the efficiency of the engine ?

(1) 10%   (2) 15%   (3) 20%   (4) 25%

Q.65 A Carnot's engine working between 300 K and 600 K has a work output of 800 J per cycle. How much heat energy is supplied to the engine from the source in each cycle ?

(1) 1400 J   (2) 1500 J   (3) 1600 J   (4) 1700 J

Q.66 A cylindrical tube of cross-sectional area A has two air tight frictionless pistons at its two ends. The pistons are tied with a straight two ends. The pistons are tied with a straight piece of metallic wire with zero tension. The tube contains a gas at atmospheric pressure P_0 and temperature T_0. If temperature of the gas is doubled then the tension in the wire is
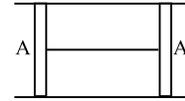
(1) $4 P_0 A$ (2) $P_0 A/2$

(3) $P_0 A$ (4) $2 P_0 A$

Q.67 A gas mixture consists of 2 moles of oxygen and 4 moles of argon at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

(1) 4 RT   (2) 15 RT   (3) 9 RT   (4) 11 RT

Q.68 If the internal energy of He sample of 100J and that is the hydrogen sample is 200J, then the internal energy of the mixture is

(1) 900 J   (2) 128.5 J   (3) 171.4 J   (4) 300 J

Q.69 A vessel is partitioned in two equal halves by a fixed diathermic separator. Two different ideal gases are filled in left (L) and right (R) halves. The rms speed of the molecules in L part is equal to the mean speed of molecules in the R part. Then the ratio of the mass of a molecules in L part to that of a molecules in R part is -
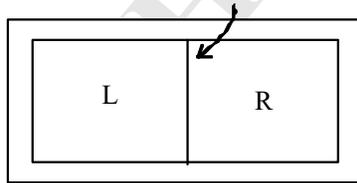
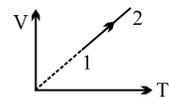(1) $\dfrac{3}{2}$ (2) $\dfrac{\pi}{4}$ (3) $\dfrac{2}{3}$ (4) $\dfrac{3\pi}{8}$

Q.70 For V versus T curves at constant pressure P_1 and P_2 for an ideal gas shown in figure -
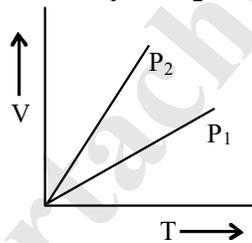
(1) $P_1 > P_2$ (2) $P_1 < P_2$ (3) $P_1 = P_2$ (4) $P_1 \quad P_2$

Q.71 An ideal gas undergoes the process $1 \rightarrow 2$ as shown in the figure, the heat supplied and work done in the process is ΔQ and ΔW respectively. The ratio $\Delta Q : \Delta W$ is

(1) $\gamma : \gamma - 1$ (2) γ

(3) $\gamma - 1$ (4) $\gamma - 1/\gamma$

Q.72 An ideal gas is taken from point A to point C on P-V diagram through two process AOC and ABC as shown in the figure. Process AOC is isothermal
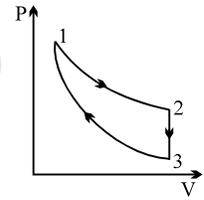
(1) Process AOC requires more heat than process ABC.

(2) Process ABC requires more heat than process AOC.

(3) Both process AOC & ABC require same amount of heat.

(4) Data is insufficient for comparison of heat requirement for the two processes.
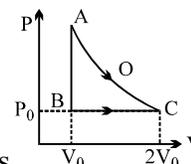
Q.73 The figure, shows the graph of logarithmic reading of pressure and volume for two ideal gases A and B undergoing adiabatic process. From figure it can be concluded that
(1) gas B is diatomic
(2) gas A and B both are diatomic
(3) gas A is monoatomic
(4) gas B is monoatomic & gas A is diatomic
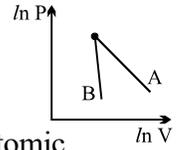
Q.74 Three processes form a thermodynamic cycle as shown on P-V diagram for an ideal gas. Process $1 \to 2$ takes place at constant temperature (300K). Process $2 \to 3$ takes place at constant volume. During this process 40J of heat leaves the system. Process $3 \to 1$ is adiabatic and temperature T_3 is 275K. Work done by the gas during the process $3 \to 1$ is
(1) -40J
(2) -20J
(3) +40J
(4) +20J

Q.75 Two identical vessels A & B contain equal amount of ideal monoatomic gas. The piston of A is fixed but that of B is free. Same amount of heat is absorbed by A & B. If B's internal energy increases by 100 J the change in internal energy of A is
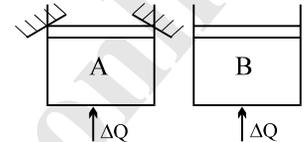
(1) 100 J
(2) $\dfrac{500}{3}$ J
(3) 250 J
(4) none of these

Q.76 2 moles of a monoatomic gas are expanded to double its initial volume, through a process P/V = constant. If its initial temperature is 300 K, then which of the following is true.
(1) $\Delta T = 900$ K
(2) $\Delta Q = 3200$ R
(3) $\Delta U = 3600$ R
(4) W = 2700 R

Q.77 Two identical glass bulbs are interconnected by a thin glass tube. A gas is filled in these bulbs at N.T.P. If one bulb is placed in ice and another bulb is placed in hot bath, then the pressure of the gas becomes 1.5 times. The temperature of hot bath will be -
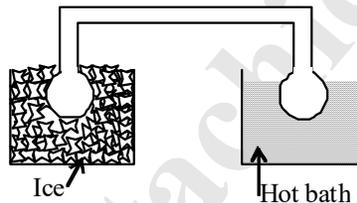
(1) 100º C
(2) 182º C
(3) 256º C
(4) 546º C

Q.78 An ideal gas is found to obey an additional law $P^2 V$ = constant. The gas is initially at temperature T and volume V. When it expands to a volume 2V, the temperature becomes -
(1) T
(2) $\sqrt{2}$ T
(3) 2T
(4) $2\sqrt{2}$ T

Q.79 Heat energy absorbed by a system in going through a cyclic process shown is figure is :
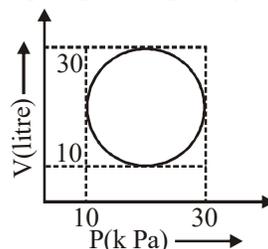
(1) $10^7 \pi$ J
(2) $10^4 \pi$ J
(3) $10^2 \pi$ J
(4) $10^{-3} \pi$ J

AIIMS SPECIAL

Direction for following questions :
A.   Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
B.   Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
C.   Assertion is true but Reason is false.
D.   Assertion and Reason both are false.

Q.80   **Assertion :** Pressure of gas is $\dfrac{2}{3}$ times translational kinetic energy of gas molecules.

   Reason : Translational degree of freedom of any type of gas is three, whether the gas is monoatomic, diatomic or polyatomic.
   (1) A   (2) B   (3) C   (4) D

Q.81   **Assertion :** Straight line on V-T graph represents isobaric process.
   Reason : If $V \propto T$ then p = constant i.e., process is isobaric.
   (1) A   (2) B   (3) C   (4) D

Q.82   **Assertion :** Total internal energy of oxygen gas at a given temperature is E, of this energy $\dfrac{3}{5}$ E is

   translational kinetic energy and $\dfrac{2}{5}$ E is rotational kinetic energy.

   Reason : Potential energy of an ideal gas zero.
   (1) A   (2) B   (3) C   (4) D

Q.83   **Assertion :** If a gas chamber containing a gas is moved translationally then temperature of gas will increase.
   Reason : Total kinetic energy of the gas molecules will increase by the translational motion of gas chamber.
   (1) A   (2) B   (3) C   (4) D

Q.84   **Assertion :** In isobaric process, $\dfrac{\Delta Q}{\Delta W}$ for helium gas is $\dfrac{5}{2}$

   Reason : In isobaric process, work done by the gas is $nR\Delta T$.
   (1) A   (2) B   (3) C   (4) D

Q.85   **Assertion :** In adiabatic expansion product of pV always decreases.
   Reason : In adiabatic expansion work done by the gas is positive
   (1) A   (2) B   (3) C   (4) D

Q.86   **Assertion :** Efficiency of any heat engine can not be greater than the heat engine of Carnot's cycle.
   Reason : Heat flow never takes place from a body at lower temperature to a body at higher temperature.
   (1) A   (2) B   (3) C   (4) D

Q.87   **Assertion :** First law of thermodynamics can be applied only for an ideal or real gas system.
   Reason : First law of thermodynamics is nothing but law of conservation of energy.
   (1) A   (2) B   (3) C   (4) D

Q.88 **Assertion :** In isobaric process $\dfrac{Q}{\Delta U}$ is equal to $\gamma (= C_p/C_v)$ of the gas.

Reason : For monoatomic gas ratio $\dfrac{Q}{\Delta U}$ in isobaric process is equal to $\dfrac{5}{3}$.

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

Q.89 **Assertion :** When an ideal diatomic is heated at constant pressure the fraction of the heat energy supplied which increases the internal energy of the gas is $\dfrac{5}{7}$.

Reason : Fraction is given by $\dfrac{\Delta U}{\delta Q} = \dfrac{C_V}{C_P}$

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

Q.90 **Assertion :** For a heat engine the thermodynamic P-V cyclic curve is always clockwise.
Reason : Only a clockwise cycle does positive work.
(1) A   (2) B   (3) C   (4) D

Q.91 **Assertion :** For an ideal gas, at constant temperature the product of pressure and volume is a constant.
Reason : The root mean square velocity of the molecules is inversely proportional to mass.
(1) A   (2) B   (3) C   (4) D

Q.92 **Assertion :** The Carnot cycle is useful in understanding the performance of heat engines.
Reason : The Carnot cycle provides a way of determining the maximum possible efficiency achievable with reservoirs of given temperatures.
(1) A   (2) B   (3) C   (4) D

ANSWER KEY

Q.1	2	Q.2	1	Q.3	1	Q.4	1	Q.5	2
Q.6	4	Q.7	2	Q.8	3	Q.9	2	Q.10	4
Q.11	3	Q.12	1	Q.13	2	Q.14	4	Q.15	2
Q.16	1	Q.17	1	Q.18	2	Q.19	**3**	Q.20	**4**
Q.21	1	Q.22	3	Q.23	1	Q.24	3	Q.25	1
Q.26	4	Q.27	4	Q.28	1	Q.29	1	Q.30	1
Q.31	3	Q.32	4	Q.33	1	Q.34	4	Q.35	2
Q.36	1	Q.37	3	Q.38	2	Q.39	1	Q.40	2
Q.41	4	Q.42	2	Q.43	3	Q.44	2	Q.45	3
Q.46	3	Q.47	3	Q.48	1	Q.49	3	Q.50	3
Q.51	1	Q.52	3	Q.53	1	Q.54	3	Q.55	4
Q.56	2	Q.57	1	Q.58	3	Q.59	3	Q.60	2
Q.61	3	Q.62	2	Q.63	1	Q.64	4	Q.65	3
Q.66	3	Q.67	4	Q.68	4	Q.69	4	Q.70	1
Q.71	1	Q.72	1	Q.73	4	Q.74	1	Q.75	2
Q.76	1	Q.77	4	Q.78	2	Q.79	4	Q.80	4
Q.81	2	Q.82	4	Q.84	2	Q.85	2	Q.86	3
Q.87	4	Q.88	2	Q.89	1	Q.90	1	Q.91	3
Q.92	1								