NEET : CHAPTER WISE TEST-12

SUBJECT :- PHYSICS **DATE.....**
CLASS :- 11th **NAME.....**
CHAPTER :- KTG & THERMODYNAMICS **SECTION.....**

(SECTION-A)

1. When an ideal gas is compressed isothermally then its pressure increases because :
(A) its potential energy decreases
(B) its kinetic energy increases and molec move apart
(C) its number of collisions per unit area with walls of container increases
(D) molecular energy increases

2. Temperature and pressure of 2g oxygen are 27° C and 76 cm Hg, then volume of the gas is :
(A) 1.53 litre (B) 2.44 litre
(C) 3.08 litre (D) 44.2 litre

3. Which of the following statements is correct for any thermodynamic system
(A) The internal energy changes in all processes
(B) Internal energy and entropy are state functions
(C) The change in entropy can never be zero
(D) The work done in an adiabatic process is always zero

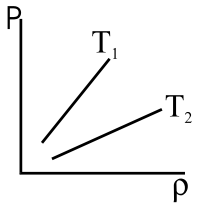
4. In which condition a real gas behaves as an ideal gas ?
(A) At high pressure
(B) At low pressure
(C) At low temperature
(D) All the above

5. Which of the following parameters does not characterise the thermodynamic state of matter?
(A) Temperature (B) Pressure
(C) Work (D) Volume

6. **Assertion :** Different gases at the same conditions of temperature and pressure have same root mean square speed.
Reason : Average K.E. of gas is inversly proportional to temperature in kelvin
(A) If both assertion and reason are true and reason is the correct explanation of assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of assertion.
(C) If Assertion is true but reason is false.
(D) If both assertion and reason are false.

7. Which of the following statement is incorrect according to assumptions of kinetic theory of gases ?
(A) Potential energy of a molecule is zero
(B) Molecules moves randomly in all directions
(C) kinetic energy of molecules change when they collids with wall of container
(D) None of these

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



(A) $T_1 > T_2$
(B) $T_1 = T_2$
(C) $T_1 < T_2$
(D) any of the three is possible

9. 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.
(A) $\sqrt{14}$ (B) $\sqrt{7}$
(C) $\sqrt{28}$ (D) None of these

10. Which of the following quantities is the same for all ideal gases at the same temperature ?
(A) the kinetic energy of 1 mole
(B) the kinetic energy of 1 g

(C) the number of molecules in 1 mole
(D) the number of molecules in 1 g

11. Three closed vessels A, B, and C are at the same temperature T and contain gases which obey the Maxwellian distribution of velocities. Vessel A contains only O_2, B only N_2 and C a mixture of equal quantities of O_2 and N_2. If the average speed of O_2 molecules in vessel A is V_1, that of the N_2 molecules in vessel B is V_2 , the average speed of the O_2 molecules in vessel C will be :
(A) $(V_1 + V_2)/2$ (B) V_1
(C) $(V_1V_2)^{1/2}$ (D) $\sqrt{3kT/M}$

12. Two non-reactive monoatomic ideal gases have their atomic masses in the ratio 2 : 3. The ratio of their partial pressures, when enclosed in a vessel kept at a constant temperature, is 4 : 3. The ratio of their densities is:
(A) 1 : 4 (B) 1 : 2
(C) 6 : 9 (D) 8 : 9

13. The gas law $\frac{PV}{T} =$ constant is true for
(A) Isothermal changes only
(B) Adiabatic changes only
(C) Both isothermal and adiabatic changes
(D) Neither isothermal nor adiabatic changes

14. A gas is compressed isothermally to half its initial volume. The same gas is compressed separately through an adiabatic process until its volume is again reduced to half. Then :
(A) Which of the case (whether compression through isothermal or through adiabatic process) requires more work will depend upon the atomicity of the gas
(B) Compressing the gas isothermally will require more work to be done
(C) Compressing the gas through adiabatic process will require more work to be done
(D) Compressing the gas isothermally or adiabatically will require the same amount of work

15. 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:
(A) 4RT (B) 15RT
(C) 9RT (D) 11RT

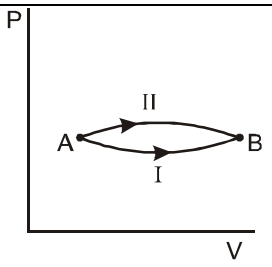
16. When temperature of a gas is increased then which of the following statements is always true ?
(A) Work is done on the gas
(B) Heat is supplied to gas
(C) Internal energy of gas is increased
(D) pressure of gas remains unchanged.

17. At the same temperature and pressure the densities of two diatomic gases are d_1 and d_2, The ratio of velocities of sound in these gases will be
(A) $\frac{d_1}{d_2}$ (B) $\sqrt{\frac{d_2}{d_1}}$
(C) $\sqrt{\frac{d_1}{d_2}}$ (D) $\frac{d_2^2}{d_1^2}$

18. Two vessels separately contain two ideal gases A and B at the same temperature the pressure of A being twice that of B. Under such conditions, the density of A is found to be 1.5 times the density of B. The ratio of molecular weight of A and B is :
(A) $\frac{3}{4}$ (B) 2 (C) $\frac{1}{2}$ (D) $\frac{2}{3}$

19. Cooking gas containers are kept in a lorry moving with uniform speed. The temperature of the gas molecules inside will :
(A) increase
(B) decrease
(C) remain same
(D) decrease for some, while increase for others

20. A system goes from A to B via two processes I and II as shown in figure. If ΔU_1 and ΔU_2 are the changes in internal energies in the processes I and II respectively, then :



(A) $\Delta U_1 = \Delta U_2$
(B) relation between ΔU_1 and ΔU_2 cannot be determined
(C) $\Delta U_2 > \Delta U_1$
(D) $\Delta U_2 < \Delta U_1$

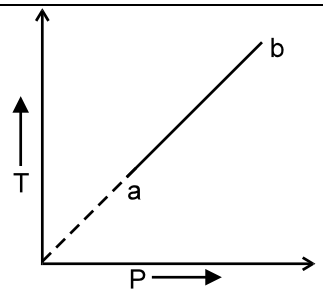
21. The ratio of the specific heats $\frac{C_P}{C_v} = \gamma$ in terms of degrees of freedom (n) is given by:

(A) $\left(1+\frac{n}{3}\right)$ (B) $\left(1+\frac{2}{n}\right)$
(C) $\left(1+\frac{n}{2}\right)$ (D) $\left(1+\frac{1}{n}\right)$

22. An insulated container of gas has two chambers separated by an insulating partition. One of the chambers has volume V_1 and contains ideal gas at pressure p_1 and temperature T_1. The other chamber has volume V_2 and contains ideal gas at pressure p_2 and temperature T_2. If the partition is removed without doing any work on the gas, the final equilibrium temperature of the gas in the container will be -

(A) $\frac{T_1T_2(p_1V_1+p_2V_2)}{p_1V_1T_2+p_2V_2T_1}$
(B) $\frac{p_1V_1T_1+p_2V_2T_2}{p_1V_1+p_2V_2}$
(C) $\frac{p_1V_1T_2+p_2V_2T_1}{p_1V_1+p_2V_2}$
(D) $\frac{T_1T_2(p_1V_1+p_2V_2)}{p_1V_1T_1+p_2V_2T_2}$

23. An ideal gas changes from state a to state b as shown in Fig. What is the work done by the gas in the process ?



(A) zero (B) positive
(C) negative (D) infinite

24. The internal energy change in a system that has absorbed 2 kcal of heat and done 500 J of work is

(A) 8900 J (B) 6400 J
(C) 5400 J (D) 7900 J

25. The molar specific heats of an ideal gas at constant pressure and volume are denoted by C_p and C_V, respectively. If $\gamma = \frac{C_p}{C_v}$ and R is the universal gas constant, then C_V is equal to :

(A) $\frac{R}{(\gamma-1)}$ (B) $\frac{(\gamma-1)}{R}$
(C) γR (D) $\frac{1+\gamma}{1-\gamma}$

26. If ΔU and ΔW represent the increase in internal energy and work done by the system respectively in a thermodynamical process, which of the following is true?

(A) $\Delta U = -\Delta W$, in a adiabatic process
(B) $\Delta U = \Delta W$, in a isothermal process
(C) $\Delta U = \Delta W$, in a adiabatic process
(D) $\Delta U = -\Delta W$, in a isothermal process

27. A thermodynamic process in which temperature *T* of the system remains constant though other variable *P* and *V* may change, is called

(A) Isochoric process
(B) Isothermal process
(C) Isobaric process

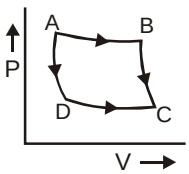
(D) None of these

28. The latent heat of vaporisation of water is 2240 *J/gm.* If the work done in the process of expansion of 1 *g* is 168 *J*, then increase in internal energy is
(A) 2408 *J* (B) 2240 *J*
(C) 2072 *J* (D) 1904 *J*

29. The molecules of a given mass of a gas have r.m.s. velocity of 200 ms^{-1} at 27ºC and 1.0×10^5 Nm^{-2} pressure. When the temperature and pressure of the gas are respectively, 127ºC and 0.05×10^5 Nm^2, the r.m.s. velocity of velocity of its molecules in ms^{-1} is ;
(A) $\frac{100}{3}$ (B) $100\sqrt{2}$
(C) $\frac{400}{\sqrt{3}}$ (D) $\frac{100\sqrt{2}}{3}$

30. A system is given 400 calories of heat and 1000 joule of work is done by the system, then the change in internal energy of the system will be -
(A) 680 joule (B) 680 erg
(C) 860 joule (D) – 860 joule

31. If AB and CD are isothermals and AD and BC are adiabatics (see fig.) then the temperatures of

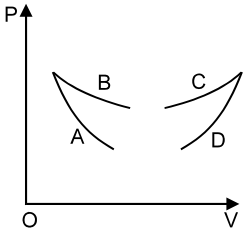


(A) B and C are same
(B) A and C are same
(C) B and D are same
(D) Temperature of A is more than that of D

32. The slopes of isothermal and adiabatic curves are related as
(A) Isothermal curve slope = adiabatic curve slope
(B) Isothermal curve slope = $\gamma\times$ adiabatic curve slope
(C) Adiabatic curve slope = $\gamma\times$ isothermal curve slope
(D) Adiabatic curve slope = $\frac{1}{2}\times$ isothermal curve slope

33. In a closed container of 44.8 litre, volume monoatomic gas at NTP is filled up. Heat required to raise temperature by 10°C will be :
(A) R (B) 10R
(C) 20R (D) 30R

34. Four curves A, B, C and D are drawn in the Fig. for a given amount of gas. The curves which represent adiabatic and isothermal changes are



(A) C and D respectively
(B) D and C respectively
(C) A and B respectively
(D) B and A respectively

35. A given sample of an ideal gas occupies a volume V at a pressure P and absolute temperature T. The mass of each molecule of the gas is m. Which of the following gives the density of the gas ?
(A) mkT (B) P / (kT)
(C) Pm / (kT) (D) P / (kTV)

(SECTION-B)

36. During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its absolute temperature. The ratio C_p/C_V for the gas is :
(A) 4/3 (B) 2
(C) 5/3 (D) 3/2

37. An ideal gas is expanded adiabatically at an initial temperature of 300 *K* so that its volume is doubled. The final temperature of the hydrogen gas is $(\gamma = 1.40)$

(A) 227.36 *K* (B) 500.30 *K*
(C) 454.76 *K* (D) $-47^{o}C$

38. A flask containing air at 27ºC is corked up at atmospheric pressure. The cork can be forced out by a pressure of 2.5 atmosphere. To what temperature the flask should be heated to do that?
(A) 150 K (B) 300 K
(C) 600 K (D) 750 K

39. For adiabatic process of an ideal gas the value of $\frac{dP}{P}$ is equal to -
(A) $-\gamma\frac{dV}{V}$ (B) $-\gamma\frac{V}{dV}$
(C) $\frac{dV}{V}$ (D) $-\gamma^2\frac{dV}{V}$

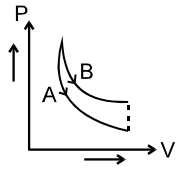
40. Two kg of water is converted into steam by boiling at atmospheric pressure. The volume changes from $2\times10^{-3}\,m^3$ to $3.34m^3$. The work done by the system is about
(A) – 340 *kJ* (B) – 170 *kJ*
(C) 170 *kJ* (D) 340 *kJ*

41. A gas is contained in a metallic cylinder fitted with a piston. The piston is suddenly moved in to compress the gas and is maintained at this position. As time passes, after this pressure of the gas in the cylinder
(A) increases
(B) decreases
(C) remains constant
(D) increases or decreases depending on the nature of the gas.

42. If C_P and C_V denote the specific heats of nitrogen per unit mass at constant pressure and constant volume respectively, then
(A) $C_P - C_V = R / 28$
(B) $C_P - C_V = R / 14$
(C) $C_P - C_V = R$
(D) $C_P - C_V = 28R$

43. A gas has :
(A) one specific heat only
(B) two specific heats only
(C) infinite number of specific heats
(D) no specific heat

44. A and B are two adiabatic curves for two different gases. Then A and B corresponds to :



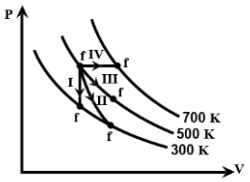
(A) Ar and He respectively
(B) He and H_2 respectively
(C) O_2 and H_2 respectively
(D) H_2 and He respectively

45. For free expansion of a gas in an adiabatic container which of the following is true ?
(A) Q = W = 0 and $\Delta U = 0$
(B) Q = 0, W > 0 and $\Delta U = Q$
(C) W = 0, Q > 0 and $\Delta U = Q$
(D) W = 0, Q < 0 and $\Delta U = 0$

46. If a diatomic gas is supplied heat Q in a process, it performs work $\frac{Q}{4}$. What is molar heat capacity of the gas in this process.
(A) $\frac{2}{5}R$ (B) $\frac{5}{2}R$
(C) $\frac{10}{3}R$ (D) $\frac{6}{7}R$

47. Even Carnot engine cannot give 100% efficiency because we cannot
(A) Prevent radiation
(B) Find ideal sources
(C) Reach absolute zero temperature
(D) Eliminate friction

48. Thermodynamic process are indicated in the following diagram.



Match the following:

Column - I	**Column - II**
P. Process I	a. Adiabatic
Q. Process II	b. Isobaric
R. Process III	c. Isochoric
S. Process IV	d. Isothermal

(A) P-d, Q-b, R-a, S-c

(B) P-a, Q-c, R-d, S-b

(C) P-c, Q-a, R-d, S-b

(D) P-c, Q-d, R-b, S-a

49. The change in internal energy of two moles of a gas during adiabatic expansion is found to be –100 joule.The work done during the process is –

(A) 100 joule (B) –100 joule

(C) zero (D) 200 joule

50. Starting the same initial conditions, an ideal gas expands from volume V_2 to V_2 in three different ways. The work done by the gas is W_1 if the process is purely isothermal, W_2 if purely isobaric and W_3 if purely adiabatic. Then:

(A) $W_2 > W_1 > W_3$ (B) $W_2 > W_3 > W_1$

(C) $W_1 > W_2 > W_3$ (D) $W_1 > W_3 > W_2$