

QB365 Question Bank Software Study Materials

Heat and Thermodynamics 50 Important 1 Marks Questions With Answers (Book Back and Creative)

11th Standard

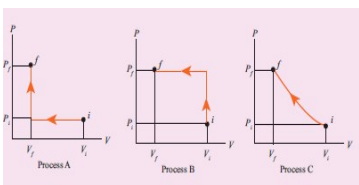
Physics

Total Marks : 50

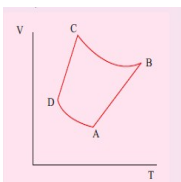
Multiple Choice Question

50 x 1 = 50

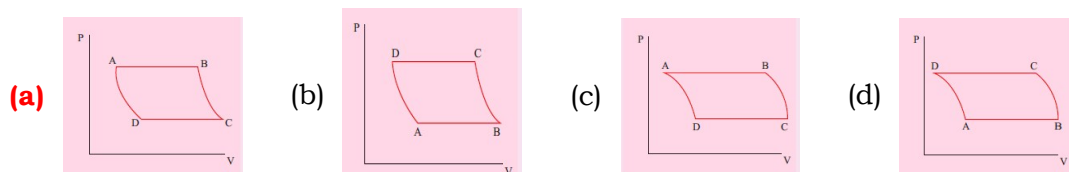
- In hot summer after a bath, the body's
 - internal energy decreases**
 - internal energy increases
 - heat decreases
 - no change in internal energy and heat
- The graph between volume and temperature in Charles' law is
 - an ellipse
 - a circle
 - a straight line**
 - a parabola
- When a cycle tyre suddenly bursts, the air inside the tyre expands. This process is
 - isothermal
 - adiabatic**
 - isobaric
 - isochoric
- An ideal gas passes from one equilibrium state (P_1, V_1, T_1, N) to another equilibrium state $(2P_1, 3V_1, T_2, N)$. Then
 - $T_1 = T_2$
 - $T_1 = \frac{T_2}{6}$**
 - $T_1 = 6T_2$
 - $T_1 = 3T_2$
- When a uniform rod is heated, which of the following quantity of the rod will increase
 - mass
 - weight
 - center of mass
 - moment of inertia**
- When food is cooked in a vessel by keeping the lid closed, after some time the steam pushes the lid outward. By considering the steam as a thermodynamic system, then in the cooking process
 - $Q > 0, W > 0,$**
 - $Q < 0, W > 0,$
 - $Q > 0, W < 0,$
 - $Q < 0, W < 0,$
- When you exercise in the morning, by considering your body as thermodynamic system, which of the following is true?
 - $\Delta U > 0, W > 0,$
 - $\Delta U < 0, W > 0,$**
 - $\Delta U < 0, W < 0,$
 - $\Delta U = 0, W > 0,$
- A hot cup of coffee is kept on the table. After some time it attains a thermal equilibrium with the surroundings. By considering the air molecules in the room as a thermodynamic system, which of the following is true
 - $\Delta U > 0, Q = 0$
 - $\Delta U > 0, W < 0$
 - $\Delta U > 0, Q > 0$**
 - $\Delta U = 0, Q > 0$
- An ideal gas is taken from (P_i, V_i) to (P_f, V_f) in three different ways. Identify the process in which the work done on the gas the most.



- Process A
 - Process B**
 - Process C
 - Equal work is done in Process A, B & C
- 10) The V-T diagram of an ideal gas which goes through a reversible cycle A→B→C→D is shown below. (Processes D→A and B→C are adiabatic)

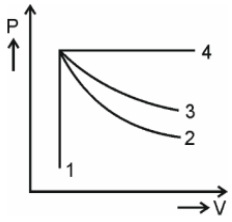


The corresponding PV diagram for the process is (all figures are schematic)



- 11) A distant star emits radiation with maximum intensity at 350 nm. The temperature of the star is
(a) 8280 K (b) 5000 K (c) 7260 K (d) 9044 K
- 12) Identify the state variables given here?
 (a) Q, T, W **(b) P, T, U** (c) Q, W (d) P, T, Q
- 13) In an isochoric process, we have
(a) W = 0 (b) Q = 0 (c) $\Delta U = 0$ (d) $\Delta T = 0$
- 14) The efficiency of a heat engine working between the freezing point and boiling point of water is
 (a) 6.25% (b) 20% **(c) 26.8%** (d) 12.5%
- 15) An ideal refrigerator has a freezer at temperature -12°C . The coefficient of performance of the engine is 5. The temperature of the air (to which the heat ejected) is
 (a) 50°C (b) 45.2°C **(c) 40.2°C** (d) 37.5°C
- 16) C_v & C_p denote the molar specific heat capacities of a gas at constant volume and constant pressure then _____.
 (a) $C_p - C_v$ is larger for a diatomic ideal gas than for a monoatomic ideal gas
(b) $C_p + C_v$ is larger for a diatomic ideal gas than for a monoatomic ideal gas
 (c) C_p / C_v is larger for a diatomic ideal gas than for a monoatomic ideal gas
 (d) $C_p \times C_v$ is lesser for a diatomic ideal gas than for a monoatomic ideal gas
- 17) A gaseous mixture consists of 16g of helium and 16g of oxygen the ratio of two specific heats of the mixture is _____.
 (a) 1.4 (b) 1.54 (c) 1.59 **(d) 1.62**
- 18) What is true of isothermal process?
 (a) $\Delta T > 0$ (b) $\Delta V = 0$ **(c) $\Delta Q = \Delta W$** (d) $PV = \text{constant}$
- 19) The absolute zero temperature is transmission as _____.
 (a) 273 K (b) -273 K **(c) -273°C** (d) 273°C
- 20) When two bodies are in thermal equilibrium with a third body, they are also in thermal equilibrium with each other. This is _____.
 (a) Kelvin Planck law (b) first law of thermodynamics **(c) zeroth law of thermodynamics**
 (d) second law of thermodynamics
- 21) The gas constant (R) is equal to the ____ of two specific heats
 (a) ratio (b) Sum (c) produce **(d) difference**
- 22) A metal sheet with a circular hole is heated. The hole will _____.
 (a) contract **(b) expand** (c) remain unaffected
 (d) contract or expand depending on the value of the linear expansion coefficient.
- 23) A perfect gas at 27°C is heated at constant pressure so as to double its volume. The temperature of the gas becomes _____.
 (a) 54°C (b) 150K **(c) 327°C** (d) 327K
- 24) The mass of 1 litre of helium under a pressure of 2 atm and at a temperature of 27°C is _____.
 (a) 0.16 g **(b) 0.32 g** (c) 0.48 g (d) 0.64 g
- 25) The correct value of 0°C on the Kelvin scale is _____.
(a) 273.15K (b) 272.85K (c) 273K (d) 273.2K

- 26) At a given volume and temperature, the pressure of a gas _____.
- (a) varies inversely as its mass (b) varies inversely as the square of its mass (c) **varies linearly as its mass**
 (d) is independent of its mass
- 27) Boyles' law is applicable in _____.
- (a) isochoric process (b) **isothermal process** (c) isobaric process (d) both (a) and (b)
- 28) A metallic solid sphere is rotating about its diameter as axis of rotation. If the temperature is increased by 200°C , the percentage increase in its moment of inertia is _____ (coefficient of linear expansion of the metal = $10^{-5}/^{\circ}\text{C}$)
- (a) 0.1 (b) 0.2 (c) 0.3 (d) **0.4**
- 29) The difference between volume and pressure coefficients of an ideal gas is _____
- (a) $\frac{1}{273}$ (b) 273 (c) $\frac{2}{273}$ (d) **zero**
- 30) Cooking takes longest time _____
- (a) at the sea level (b) at Shimla (c) **at mount Everest (if tried)** (d) in a submarine 100 m below the surface of water
- 31) A closed bottle containing water at room temperature is taken to the moon and then the lid is opened. The water will_____.
- (a) freeze (b) **boil** (c) decompose into hydrogen and oxygen (d) not change at all.
- 32) We consider a thermodynamic system. If ΔU represent the increase in its energy and W the work done by the system, which of the following statements is true?
- (a) $\Delta U = -W$ in an isothermal process (b) **$\Delta U = -W$ in an adiabatic process** (c) $\Delta U = -W$ in an isothermal process
 (d) $\Delta U = W$ in an adiabatic process
- 33) In a given process on an ideal gas, $dW = 0$ and $dQ < 0$. Then for the gas_____.
- (a) **The temperature will decrease.** (b) the volume will decrease (c) the pressure will remain constant
 (d) the temperature will increase.
- 34) The internal energy of an ideal gas depends on _____.
- (a) only pressure (b) only volume (c) **only temperature** (d) none of these
- 35) Which of the following process is reversible?
- (a) transfer of heat by radiation (b) Transfer of heat by conduction (c) Electrical heating of nichrome wire
 (d) **Isothermal compression**
- 36) Ten moles of an ideal gas at constant temperature 600 K is compressed from 100L to 10 L. The work done in the process is_____.
- (a) $4.11 \times 10^4 \text{ J}$ (b) $-4.11 \times 10^4 \text{ J}$ (c) $11.4 \times 10^4 \text{ J}$ (d) **$-11.4 \times 10^4 \text{ J}$**
- 37) Heat gives to a body that raises its temperature by 1°C is
- (a) water equivalent (b) **thermal capacity** (c) specific heat (d) temperature gradient
- 38) Which of the following statements is correct for any thermodynamic system?
- (a) Internal energy changes in all processes. (b) **Internal energy and entropy are state functions.**
 (c) The change in entropy can never be zero (d) none of the above
- 39) The top of a lake is frozen. Air in contact with the surface of the lake is at -5°C . Then the maximum, temperature of the water in contact with the lower surface will be
- (a) -15°C (b) -1.5°C (c) 4°C (d) **0°C**
- 40) A gas at NTP is slowly compressed to one fourth of its original volume. Then the final pressure is _____ atmosphere.
- (a) **4** (b) 0.75 (c) 8 (d) 0.25

- 41) A carnot engine takes 300 cal of heat at 500 K and rejects 150 cal of heat to the sink. The temperature of the sink is
 (a) 1000 K (b) 125 K **(c) 250 K** (d) 750 K
- 42) A block of ice in a room at normal temperature
 (a) radiates more than its absorbs **(b) radiates less but absorbs more** (c) does not radiate (d) none of the above
- 43) First law of thermodynamics is a consequence of conservation of
 (a) mass **(b) energy** (c) charge (d) momentum
- 44) If the efficiency of carnot's engine is 100% and temperature of source is infinity then temperature of sink is
 (a) infinity **(b) zero** (c) unity (d) none of the above
- 45) 5 mol of oxygen is heated at constant volume from 10°C to 20°C. If $R = 8.36 \text{ J/mol/}^\circ\text{C}$ and $C_p = 8 \text{ cal/mol/}^\circ\text{C}$, then the amount of heat consumed by oxygen is _____ cal.
 (a) 400 **(b) 300** (c) 200 (d) 100
- 46) The process in which heat transfer is by actual movement of molecules in fluids such as liquids and gases is called:
 (a) Thermal conductivity **(b) Convection** (c) Conduction (d) Radiation
- 47) An ideal gas at 27°C is compressed adiabatically to $\frac{8}{27}$ of its original volume. If $\gamma = \frac{5}{3}$ then the rise in temperature is _____
 (a) 450°C **(b) 375°C** (c) 255°C (d) 405°C
- 48) One mole of a diatomic gas ($\gamma = 1.4$) is compressed adiabatically so that its temperature rises from 27 °C to 127°C. If $R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$ then the work done is _____
(a) 2075 J (b) 207.5 J (c) 4150 J (d) 1037J
- 49) An ideal gas undergoes four different processes from the same initial state as shown in the figure below. Those processes are adiabatic, isothermal, isobaric and isochoric. The curve which represents the adiabatic process among 1, 2, 3 and 4 is

 (a) 1 **(b) 2** (c) 3 (d) 4
- 50) The SI unit for specific heat capacity is :
(a) $\text{JKg}^{-1} \text{K}^{-1}$ (b) JKg^{-1} (c) $\text{JKg}^{-1} \text{J}^{-1}$ (d) $\text{JKg} \text{K}^{-1}$