1. An ideal gas whose adiabatic exponent is γ is expanded so that the amount of heat transferred to the gas is equal to the decrease of its internal energy. Molar heat capacity of the gas for this process is

(A) $\frac{R}{1-\gamma}$ (B) $\frac{R}{\gamma-1}$ (C) R (D) $\frac{R}{2}$

2. The molar heat capacity for a process is $C = \frac{R}{\gamma-1} + \frac{\alpha}{T}$, then process equation is –

(A) $Ve^{-(\alpha/R)T}$ = Constant (B) $Ve^{(\alpha/R)T}$ = constant

(C) VT = constant (D) V/T = constant

3. An ideal gas is expanded so that amount of heat given is equal to the decrease in internal energy. The gas undergoes the process $TV^{1/5}$ = constant. The adiabatic compressibility of gas when pressure is P, is

(A) $\frac{7}{5P}$ (B) $\frac{5}{7P}$ (C) $\frac{2}{5P}$ (D) $\frac{7}{3P}$

4. The internal energy of a diatomic gas is given as $U = U_0V$, where U_0 is a constant. Molar heat capacity of gas is

(A) $\frac{5}{2}$ R (B) $\frac{7}{2}$ R (C) $\frac{9}{2}$ R (D) $\frac{3}{2}$ R

5. Two moles of monoatomic gas is mixed with one mole of diatomic gas at the same temperature. Molar heat capacity at constant volume for the mixture is

(A) $\frac{13R}{6}$ (B) $\frac{11R}{6}$ (C) $\frac{5R}{3}$ (D) $\frac{7R}{6}$

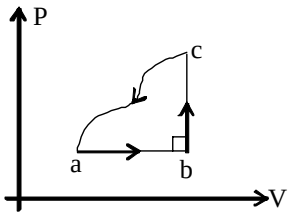
6. If for a gas $R/C_v = 2/3$, then the gas is

(A) monoatomic (B) diatomic (C) triatomic (D) polyatomic

7. During an adiabatic process, the pressure of a gas is proportional to the cube of its absolute temperature. The value of C_p/C_v for that gas is

(A) 3/5 (B) 4/3 (C) 5/3 (D) 3/2

8. A gas is taken through a cyclic process. The change in internal energy along the path from c to a is – 160 J. Heat transferred along the path from a to b is 200 J and 40 J from path b to c. Then -



(A) work done in the cycle is less than 80 J (B) work done in path abc is 80 J

(C) work done in path ab is 160 J (D) net heat transferred is less than 80 J

9. Which of the following functions are path independent ?

(A) work (B) heat

(C) internal energy (D) gravitational P.E.

10. In which process, there is no change in internal energy of the system–

(A) Isothermal (B) adiabatic (C) free expansion (D) cyclic

11. A gas kept in a container of finite conductivity is suddenly compressed. The process–

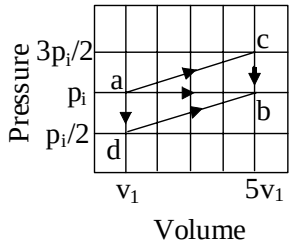
(A) must be very nearly adiabatic (B) must be very nearly isothermal

(C) may be very nearly adiabatic (D) may be very nearly isothermal

12. For an ideal gas find the equation of a process in which the heat capacity of the gas varies with temperature according to the law $C = \alpha/T$, with α = const.

13. An ideal heat engine received 3360 J of heat during a cycle from a heater whose temperature is 500 K. Determine the amount of heat given away during a cycle to a cooler whose temperature is 400 K. Calculate the work done by the engine during a cycle.

14. A sample of gas undergoes a transition from an initial state *'a'* to a final state *'b'* by three different paths (processes), as shown in the p-V diagram in Figure. Based on diagram match the following-



Column I	**Column II**
(A) Varying Pressure	(P) in process *'ac'*
(B) Varying Volume	(Q) in process *'cb'*
(C) Varying Temp.	(R) in process *'ab'*
(D) Decrease in internal Energy	(S) in process *'db'*

Answers

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1. (B) **2.** (B) **3.** (B) **4.** (B) **5.** (B) **6.** (A) **7.** (D) **8.** (ABD) **9.** (CD)

10. (ACD) **11.** (CD) **12.** $VT^{1/(\gamma-1)}e^{\alpha/RT}$ = const.

13. W = (3360 – 2688) J = 672 J. **14.** A $\rightarrow$ P,Q,S ; B $\rightarrow$ P,R, S ; C $\rightarrow$ P,Q,R,S ; D $\rightarrow$ Q