Chapter : THERMODYNAMICS

Assignment 2

Class 11

DPP

DAILY PRACTICE PROBLEMS

CLASS : XITH | **SUBJECT : PHYSICS**

DATE : | **DPP NO. : 2**

Topic :- THERMODYNAMICS

1. For an engine operating between t_1°C and t_2°C, the efficiency will be

   a) $\frac{t_1}{t_2}$ b) $1-\frac{t_2}{t_1}$ c) $\frac{t_1-t_2}{t_2}$ d) $\frac{t_1-t_2}{t_1+273}$

2. A thermally insulated vessel contains an ideal gas of molecular mass M and ratio of specific heats γ. It is moving with speed v and is suddenly brought to rest. Assuming no heat is lost to the surroundings, its temperature increases by

   a) $\frac{(\gamma-1)}{2(\gamma+1)R}Mv^2$ b) $\frac{(\gamma-1)}{2\gamma R}Mv^2$ c) $\frac{\gamma Mv^2}{2R}$ d) $\frac{(\gamma-1)}{2R}Mv^2$

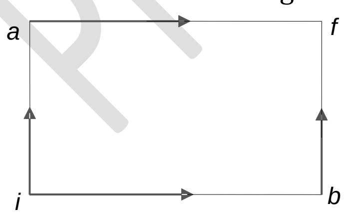
3. If γ denotes the ratio of two specific heats of a gas, the ratio of slopes of adiabatic and isothermal PV curves at their point of intersection is

   a) $1/\gamma$ b) γ c) $\gamma-1$ d) $\gamma+1$

4. In the adiabatic compression, the decrease in volume is associated with

   a) Increase in temperature and decrease in pressure
   b) Decrease in temperature and increase in pressure
   c) Decrease in temperature and decrease in pressure
   d) Increase in temperature and increase in pressure

5. When a system is taken from state i to state f along the path iaf, it is found that Q=50 cal and W=20 cal. Along the path ibf, Q=36 cal. W along the path ibf is



   a) 6 cal b) 16 cal c) 66 cal d) 14 cal

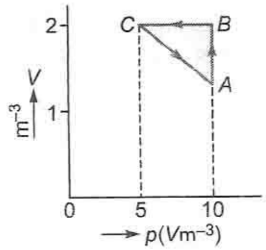
6. For an isothermal expansion of a perfect gas, the value of $\frac{\Delta P}{P}$ is equal

   a) $-\gamma^{1/2}\frac{\Delta V}{V}$ b) $-\frac{\Delta V}{V}$ c) $-\gamma\frac{\Delta V}{V}$ d) $-\gamma^2\frac{\Delta V}{V}$

7. During an adiabatic process, the pressure p of a fixed mass of an ideal gas changes by Δp and its volume V changes ΔV. If $\gamma = C_p/C_v$, then $\Delta V/V$ is given by

a) $-\frac{\Delta p}{p}$ b) $-\gamma\frac{\Delta p}{p}$ c) $-\frac{\Delta p}{\gamma p}$ d) $-\frac{\Delta p}{\gamma^2 p}$

8. An ideal gas is taken through the cycle $A \to B \to C \to A$ as shown in figure. If the net heat `supplied to the gas in cycle is 5J, work done by the gas in the process $C \to A$



a) −5 J b) −10 J c) −15 J d) −20 J

9. The efficiency of a Carnot engine working between 800 K and 500 K is

a) 0.4 b) 0.625 c) 0.375 d) 0.5

10. When a small amount of heat ΔQ is added to an enclosed gas, then increase in internal energy and external work done are related as

a) $mC_v\Delta T = Q + p\Delta V$ b) $\Delta Q = mC_v\Delta T + p\Delta V$ c) $mC_v = \Delta Q + p\Delta V$ d) $\Delta Q = mC_p\Delta T + p\Delta V$

11. $C_v and\ C_p$ denote the molar specific heat capacities of a gas at constant volume and constant pressure, respectively. 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) $\frac{C_p}{C_v}$ is larger for a diatomic ideal gas than for a monoatomic ideal gas

d) $C_p . C_v$ is larger for a diatomic ideal gas than for a monoatomic ideal gas

12. The adiabatic elasticity of hydrogen gas ($\gamma = 1.4$) at NTP is

a) $1 \times 10^5 N/m^2$ b) $1 \times 10^{-8} N/m^2$ c) $1.4\ N/m^2$ d) $1.4 \times 10^5\ N/m^2$

13. Which statement is incorrect

a) All reversible cycles have same efficiency

b) Reversible cycle has more efficiency than an irreversible one

c) Carnot cycle is a reversible one

d) Carnot cycle has the maximum efficiency in all cycles

14. If for hydrogen $C_p - C_v = m$ and for the nitrogen $C_p - C_v = n$, where C_p, C_v refer to specific heats per unit mass respectively at constant pressure and constant volume, the relation between m and n is

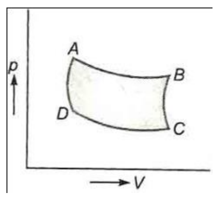
a) $m = 14\ n$ b) $n = 7\ n$ c) $m = 7\ n$ d) $n = 14\ n$

15. If $\gamma = 2.5$ and volume is equal to $\frac{1}{8}$ times to the initial volume then pressure P is equal to (initial pressure $= P$)
a) $P' = P$ b) $P' = 2P$ c) $P' = P \times (2)^{15/2}$ d) $P' = 7P$

16. What is the value of sink temperature when efficiency of engine is 100%?
a) Zero b) 300 K c) 273 K d) 400 K

17. One mole of an ideal gas expands adiabatically from an initial temperature T_1 to a final temperature T_2.The work done by the gas would be
a) $(C_p - C_v)(T_1 - T_2)$ b) $C_p(T_1 - T_2)$ c) $C_v(T_1 - T_2)$ d) $(C_p - C_v)(T_1 + T_2)$

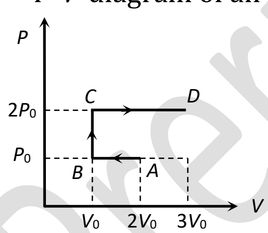
18. In the indicator diagram T_a, T_b, T_c, T_d represent temperature of gas at A, B, C, D respectively. Which of the following is correct relation?



a) $T_a = T_b = T_c = T_d$ b) $T_a \neq T_b \neq T_c \neq T_d$
c) $T_a = T_b$ and $T_c = T_d$ d) None of these

19. A gas for which $\gamma = 1.5$ is suddenly compressed to the $\frac{1}{4}$ th of the initial volume. Then the ratio of the final to the initial pressure is
a) 1: 6 b) 1: 8 c) 1: 4 d) 8: 1

20. P-V diagram of an ideal gas is as shown in figure. Work done by the gas in process $ABCD$ is



a) $4P_0V_0$ b) $2P_0V_0$ c) $3P_0V_0$ d) P_0V_0