PRERNA EDUCATION
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Chapter : THERMODYNAMICS

Assignment 3

Class 11

DPP

DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 3**

Topic :- THERMODYNAMICS

1. A refrigerator absorbs 2000 cals of heat from ice trays. If the coefficient of performance is 4, then work done by the motor is
   a) 2100 J b) 4200 J c) 8400 J d) 500 J

2. In the certain process, 400 cal of heat are supplied to a system and at the same time 105 J of mechanical work was done on the system. The increase in its internal energy is
   a) 20 cal b) 303 cal c) 404 cal d) 425 cal

3. The isothermal Bulk modulus of an ideal gas at pressure P is
   a) P b) γP c) $P/2$ d) P/γ

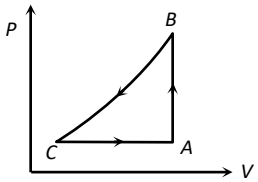
4. A Carnot's engine works between a source at a temperature of 27°C and a sink at -123°C. Its efficiency is
   a) 0.5 b) 0.25 c) 0.75 d) 0.4

5. A container of volume $1m^3$ is divided into two equal compartments by a partition. One of these compartments contains an ideal gas at 300 K. The other compartment is vacuum. The whole system is thermally isolated from its surroundings. The partition is removed and the gas expands to occupy the whole volume of the container. Its temperature now would be
   a) 300 K b) 239 K c) 200 K d) 100 K

6. A container that suits the occurrence of an isothermal process should be made of
   a) Copper b) Glass c) Wood d) Cloth

7. A Carnot engine whose source is at 400 K take 200 cal of heat and rejects 150 cal to the sink. What is the temperature of the sink?
   a) 800 K b) 400 K c) 300 K d) Cannot say

8. A sample of an ideal gas is taken through a cycle a shown in figure. It absorbs $50J$ of energy during the process AB, no heat during BC, rejects $70J$ during CA. $40J$ of work is done on the gas during BC. Internal energy of gas at A is $1500J$, the internal energy at C would be



a) $1590\ J$ b) $1620\ J$ c) $1540\ J$ d) 1570

9. The change in internal energy of a given mass of gas, when its volume changes from V to $2V$ at constant pressure p is ($\frac{C_p}{C_v} = \gamma$, universal gas constant=R)

a) $\frac{pV}{\gamma}$ b) $\frac{pV}{(2\gamma-1)}$ c) $\frac{pV}{2(\gamma-1)}$ d) $\frac{pV}{(\gamma-1)}$

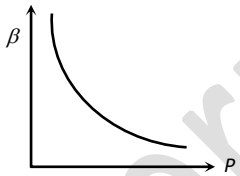
10. A perfect gas contained in a cylinder is kept in vacuum. If the cylinder suddenly bursts, then the temperature of the gas

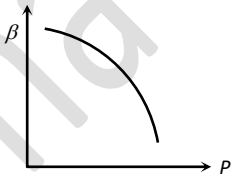
a) Remains constant b) Becomes zero c) Increases d) Decreases

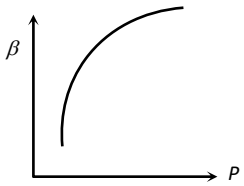
11. If $R =$ universal gas constant, the amount of heat needed to raise the temperature of 2 mole of an ideal monoatomic gas from $273K$ and $373K$ when no work is done

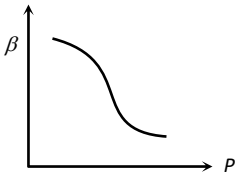
a) $100\ R$ b) $150\ R$ c) $300\ R$ d) $500\ R$

12. Which of the following graphs correctly represents the variation of $\beta = -(dV/dP)V$ with P for an ideal gas at constant temperature

a) 

b) 

c) 

d) 

13. In changing the state of a gas adiabatically from an equilibrium state A to another equilibrium state B, an amount of work equal to $22.3\ J$ is done on the system. If the gas is taken from state A to B via a process in which the net heat absorbed by the system is 9.35 calories, the net work done by the system in latter case will be

a) $5.9\ J$ b) $16.9\ J$ c) $9.3\ J$ d) $4.6\ J$

14. An ideal gas expands isothermally from a volume V_1 to V_2 and then compressed to original volume V_1 adiabatically. Initial pressure is p_1 and final pressure is p_3. Total work done is W. Then

a) $p_3 > p_1; W > 0$ b) $p_3 < p_1; W < 0$ c) $p_3 > p_1; W < 0$ d) $p_3 = p_1; W = 0$

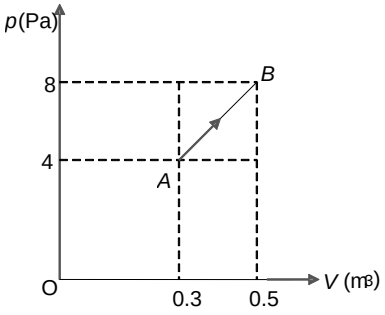
15. N moles of an ideal diatomic gas are in a cylinder at temperature T. Suppose on supplying heat to the gas, its temperature remains constant but n moles get dissociated into atoms. Heat supplied to the gas is

a) Zero b) $\frac{1}{2}nRT$ c) $\frac{3}{2}nRT$ d) $\frac{3}{2}(N-n)RT$

16. In a thermodynamic process pressure of a fixed mass of a gas is changed in such a manner that the gas releases 30 *joules* of heat and 10 joules of work was done on the gas. If the initial internal energy of the gas was 30 *joules*, then the final internal energy will be

a) 2 J b) -18 J c) 10 J d) 58 J

17. An ideal gas expands along the path AB as shown in the p-V diagram. The work done is



a) 4×10^4J b) 1.2×10^5 J c) 2.4×10^5J d) None of the above

18. A refrigerator works between temperature of melting ice and room temperature (17°C). The amount of energy in kWh that must be supplied to freeze 1 kg of water at0°C is

a) 1.4 b) 1.8 c) 0.058 d) 2.5

19. The pressure and density of a diatomic gas ($\gamma = 7/5$) change from (p, ρ) to (p^-, ρ^-) during an adiabatic change. If $\frac{\rho'}{\rho} = 32$, value of $\frac{p'}{p}$ is

a) 32 b) 1/32 c) 128 d) 1/128

20. An ideal gas is subjected to cyclic process involving four thermodynamic states, the amounts of heat (Q) and work (W) involved in each of these states

$Q_1 = 6000\,J, Q_2 = -5500J, Q_3 = -3000J, Q_4 = 3500J$

$W_1 = 2500\,J, W_2 = -1000J, W_3 = -1200J, W_4 = xJ$

The ratio of the net work done by the gas to the total heat absorbed by the gas is η. The values of x and η respectively are

a) 500; 7.5% b) 700; 10.5% c) 1000; 21% d) 1500; 15%