1. 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- **[AIEEE - 2002]**

(1) 4/3 (2) 2

(3) 5/3 (4) 3/2

2. If mass-energy equivalence is taken into account, when water is cooled to form ice, the mass of water should- **[AIEEE - 2002]**

(1) increase

(2) remain unchanged

(3) decrease

(4) first increase then decrease

3. Even carnot engine cannot give 100% efficiency because we cannot- **[AIEEE - 2002]**

(1) prevent radiation

(2) find ideal sources

(3) reach absolute zero temperature

(4) eliminate friction

4. "Heat cannot be itself flow from a body at lower temperature to a body at higher temperature" is a statement or consequence of- **[AIEEE - 2003]**

(1) second law of thermodynamics

(2) conservation of momentum

(3) conservation of mass

(4) first law of thermodynamics

5. Which of the following parameters does not characterise the thermodynamic state of matter ? **[AIEEE - 2003]**

(1) Temperature (2) Pressure

(3) Work (4) Volume

6. A carnot engine takes 3×10^6 cal of heat from a reservoir at 627 °C and gives it to a sink at 27 °C. The work done by the engine is- **[AIEEE - 2003]**

(1) 4.2×10^6 J

(2) 8.4×10^6 J

(3) 16.8×10^6 J

(4) zero

7. Which of the following statements is correct for any thermodynamic system ? **[AIEEE - 2004]**

(1) The internal energy changes in all processes

(2) Internal energy and entropy are state functions

(3) The change in entropy can never be zero

(4) The work done in an adiabatic process is always zero

8. Which of the following is incorrect regarding the first law of thermodynamics ? **[AIEEE - 2005]**

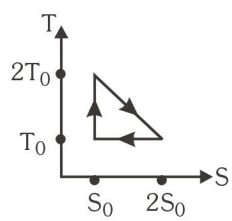
(1) It is applicable to any cyclic process

(2) It is a restatement of the principle of conservation of energy

(3) It introduces the concept of the internal energy

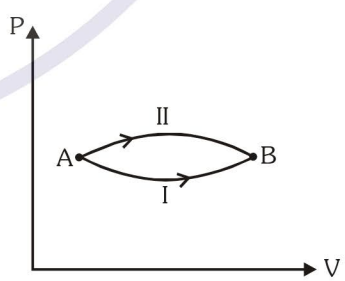
(4) It introduced the concept of the entropy

9. The temperature-entropy diagram of a reversible engine cycle is given in the figure. Its efficiency is- **[AIEEE - 2005]**



(1) 1/2 (2) 1/4 (3) 1/3 (4) 2/3

10. 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- **[AIEEE - 2005]**



(1) $\Delta U_1 = \Delta U_2$

(2) relation between ΔU_1 and ΔU_2 cannot be determined

(3) $\Delta U_2 > \Delta U_1$

(4) $\Delta U_2 < \Delta U_1$

11. The work of 146 kJ is performed in order to compress one kilo mole of a gas adiabatically and in this process the temperature of the gas increases by 7°C. The gas is- ($R = 8.3\ J\ mol^{-1}\ K^{-1}$) **[AIEEE - 2006]**

(1) diatomic

(2) triatomic

(3) a mixture of monoatomic and diatomic

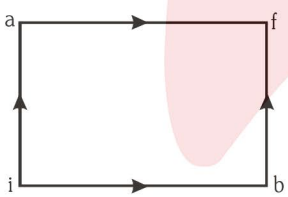
(4) monoatomic

12. A carnot engine, having an efficiency of $\eta = 1/10$ as heat engine, is used as a refrigetator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is- **[AIEEE - 2007]**

(1) 99 J (2) 90 J

(3) 1 J (4) 100 J

13. 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- **[AIEEE - 2007]**

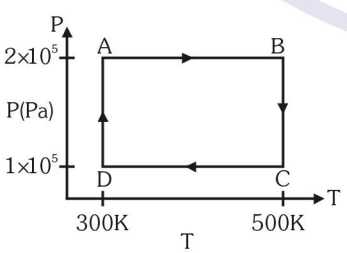


(1) 6 cal (2) 16 cal

(3) 66 cal (4) 14 cal

Directions : Question number 14, 15 and 16 are based on the following paragraph.

Two moles of helium gas are taken over the cycle ABCDA, as shown in the P–T diagram.



14. Assuming the gas to be ideal the work done by the gas in taking it from A to B is :- **[AIEEE - 2009]**

(1) 400 R (2) 500 R

(3) 200 R (4) 300 R

15. The work done on the gas in taking it from D to A is :- **[AIEEE - 2009]**

(1) –690 R (2) +690 R

(3) –414 R (4) +414 R

16. The net work done by the gas in the cycle ABCDA is:- **[AIEEE - 2009]**

(1) 1076 R (2) 1904 R

(3) Zero (4) 276 R

17. A diatomic ideal gas is used in a carnot engine as the working substance. If during the adiabatic expansion part of the cycle the volume of the gas increases from V to 32 V, the efficiency of the engine is :- **[AIEEE - 2010]**

(1) 0.25 (2) 0.5

(3) 0.75 (4) 0.99

18. A Carnot engine operating between temperatures T_1 and T_2 has efficientcy $\frac{1}{6}$. When T_2 is lowered by 62 K, its efficiency increases to $\frac{1}{3}$. Then T_1 and T_2 are, respectively :- **[AIEEE - 2011]**

(1) 330 K and 268 K

(2) 310 K and 248 K

(3) 372 K and 310 K

(4) 372 K and 330 K

19. 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 broght to rest. Assuming no heat is lost to the surroundings, its temperature increases by :- **[AIEEE - 2011]**

(1) $\frac{\gamma Mv^2}{2R}K$

(2) $\frac{(\gamma-1)}{2R}Mv^2K$

(3) $\frac{(\gamma-1)}{2(\gamma+1)R}Mv^2K$

(4) $\frac{(\gamma-1)}{2\gamma R}Mv^2K$

20. 100 g of water is heated from 30°C to 50°C Ignoring the slight expansion of the water, the change in its internal energy is (specific heat of water is 4184 J/kg/K) :- **[AIEEE - 2011]**

(1) 84 kJ (2) 2.1 kJ

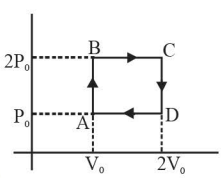
(3) 4.2 kJ (4) 8.4 kJ

21. A container with insulating walls is divided into two equal parts by a partition fitted with a valve. One part is filled with an ideal gas at a pressure P and temperature T, whereas the other part is completely evacuated. If the valve is suddenly opened, the pressure and temperature of the gas will be :- **[AIEEE - 2011]**

(1) $\frac{P}{2}, T$ (2) $\frac{P}{2}, \frac{T}{2}$

(3) P, T (4) $P, \frac{T}{2}$

22. Helium gas goes through a cycle ABCDA (consisting of two isochoric and two isobaric lines) as shown in figure. Efficiency of this cycle is nearly (Assume the gas to be close to ideal gas) :- **[AIEEE - 2012]**



(1) 12.5% (2) 15.4%

(3) 9.1% (4) 10.5%

23. A Carnot engine, whose efficiency is 40% takes in heat from a source maintained at a temperature of 500 K. It is desired to have an engine of efficiency 60%. Then, the intake temperature for the same exhaust (sink) temperature must be :- **[AIEEE - 2012]**

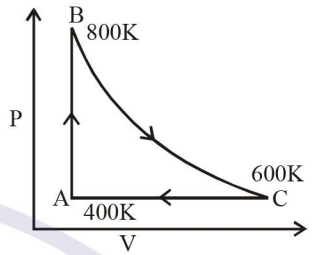
(1) 600 K

(2) efficiency of Carnot engine cannot be made larger than 50%

(3) 1200 K

(4) 750 K

24. One mole of diatomic ideal gas undergoes a cyclic process ABC as shown in figure. The process BC is adiabatic. The temperatures at A, B and C are 400 K, 800 K and 600 K respectively. Choose the correct statement : **[JEE(Main)-2014]**



(1) The change in internal energy in the process AB is –350 R.

(2) The change in internal energy in the process BC is –500R

(3) The change in internal energy in whole cyclic process is 250 R.

(4) The change in internal energy in the process CA is 700 R.

25. Consider a spherical shell of radius R at temperature T. The black body radiation inside it can be considered as an ideal gas of photons with internal energy per unit volume $u = \frac{U}{V} \propto T^4$ and pressure $p = \frac{1}{3}\left(\frac{U}{V}\right)$. If the shell now undergoes an adiabatic expansion the relation between T and R is - **[JEE(Main)-2015]**

(1) $T \propto \frac{1}{R}$ (2) $T \propto \frac{1}{R^3}$

(3) $T \propto e^{-R}$ (4) $T \propto e^{-3R}$

26. A solid body of constant heat capacity 1 J°/C is being heated by keeping it in contact with reservoirs in two ways - **[JEE(Main)-2015]**

(i) Sequentially keeping in contact with 2 reservoirs such that each reservoir supplies same amount of heat.

(ii) Sequentially keeping in contact with 8 reservoirs such that each reservoir supplies same amount of heat. In both the cases body is brought from initial temperature 100°C to final temperature 200°C. Entropy change of the body in the two cases respectively is -

(1) ln2, 2ln2 (2) 2ln2, 8ln2

(3) ln2, 4ln2 (4) ln2, ln2

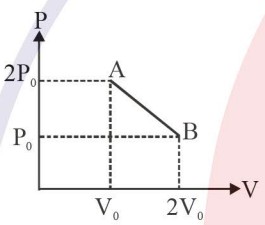
27. Consider an ideal gas confined in an isolated closed chamber. As the gas undergoes an adiabatic expansion, the average time of collision between molecules increases as V^q, where V is the volume of the gas. The value of q is :- $\left(\gamma = \frac{C_p}{C_v}\right)$

[JEE(Main)-2015]

(1) $\frac{\gamma+1}{2}$ (2) $\frac{\gamma-1}{2}$ (3) $\frac{3\gamma+5}{6}$ (4) $\frac{3\gamma-5}{6}$

28. 'n' moles of an ideal gas undergoes a process $A \rightarrow B$ as shown in the figure. The maximum temperature of the gas during the process will be :

[JEE(Main)-2016]



(1) $\frac{9P_0V_0}{nR}$ (2) $\frac{9P_0V_0}{4nR}$ (3) $\frac{3P_0V_0}{2nR}$ (4) $\frac{9P_0V_0}{2nR}$

29. An ideal gas undergoes a quasi static, reversible process in which its molar heat capacity C remains constant. If during this process the relation of pressure P and volume V is given by PV^n = constant, then n is given by (Here C_P and C_V are molar specific heat at constant pressure and constant volume, respectively) :-

[JEE(Main)-2016]

(1) $n = \frac{C-C_V}{C-C_P}$ (2) $n = \frac{C_P}{C_V}$

(3) $n = \frac{C-C_P}{C-C_V}$ (4) $n = \frac{C_P-C}{C-C_V}$

30. Two moles of an ideal monoatomic gas occupies a volume V at 27°C. The gas expands adiabatically to a volume 2V. Calculate (a) the final temperature of the gas and (b) change in its internal energy.

[JEE-Main 2018]

(1) (a) 195 K (b) –2.7 kJ

(2) (a) 189 K (b) –2.7 kJ

(3) (a) 195 K (b) 2.7 kJ

(4) (a) 189 K (b) 2.7 kJ

PREVIOUS YEARS QUESTIONS				ANSWER KEY						Exercise-II
Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**4**	**3**	**3**	**1**	**3**	**2**	**2**	**4**	**3**	**1**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**1**	**2**	**1**	**1**	**4**	**4**	**3**	**3**	**2**	**4**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**2**	**4**	**2**	**1**	**4**	**1**	**2**	**3**	**2**