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NEET THERMODYNAMICS (PHYSICS) — PYQS

Max. Marks: 220 **Questions:** 55

Section A (MCQ) — 55 questions

Q.1 An electric heater supplies heat to a system at a rate of 100 W. If the system performs work at a rate of 75 J/s, then the rate at which internal energy increases will be : [NEET (UG) 2026]

(1) 75 W (2) 25 W (3) 100 W (4) 125 W

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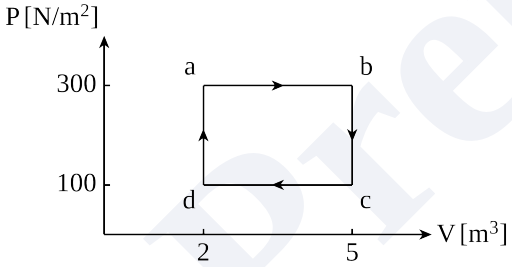
Q.2 In an adiabatic expansion, the temperature of one mole of an ideal monatomic gas ($\gamma = 5/3$) decreases from 60 K to 50 K. The work done by the gas in the process is:
(Take the universal gas constant as
$R = 8.3\ J\ mol^{-1}\ K^{-1}$) [RE-NEET (UG) 2026]

(1) 166 J (2) 41.5 J (3) 83 J (4) 124.5 J

Scan or tap for the full solution

Q.3 One mole of an ideal monatomic gas undergoes a cyclic process as shown in the figure. The total heat supplied to the gas is: [RE-NEET (UG) 2026]



(1) 800 J (2) 400 J (3) 500 J (4) 600 J

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Q.4 Two gases A and B are filled at the same pressure in separate cylinders with movable pistons of radius r_A and r_B, respectively. On supplying an equal amount of heat to both the systems reversibly under constant pressure, the pistons of gas A and B are displaced by 16 cm and 9 cm, respectively. If the change in their internal energy is the same, then the ratio $\frac{r_A}{r_B}$ is equal to [NEET (UG) 2025]

(1) $\frac{2}{\sqrt{3}}$ (2) $\frac{\sqrt{3}}{2}$ (3) $\frac{4}{3}$ (4) $\frac{3}{4}$

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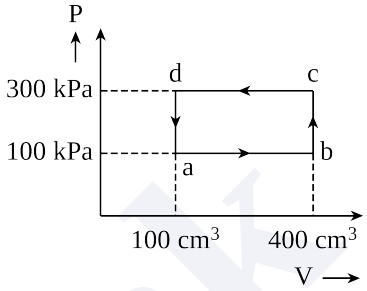
Q.5 A thermodynamic system is taken through the cycle abcda. The work done by the gas along the path bc is: [NEET (UG) 2024]



(1) Zero (2) 30 J (3) −90 J (4) −60 J

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Q.6 The equilibrium state of a thermodynamic system is described by

A. Pressure B. Total heat
C. Temperature D. Volume
E. Work done

Choose the most appropriate answer from the options given below. [RE-NEET (UG) 2024]

(1) A, B and E only (2) B, C and D only
(3) A, B and C only (4) A, C and D only

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Q.7 A Carnot engine has an efficiency of 50% when its source is at a temperature 327°C. The temperature of the sink is :- [NEET (UG) 2023]

(1) 15°C (2) 100°C (3) 200°C (4) 27°C

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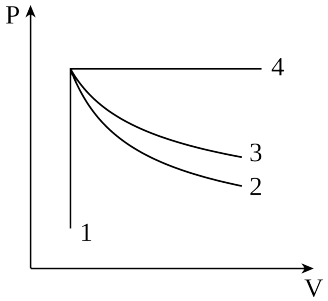
Q.8 An ideal gas undergoes four different processes from the same initial state as shown in the figure below. Those processes are adiabatic, isothermal, isobaric and isochoric. The curve which represents the adiabatic process among 1, 2, 3 and 4 is [NEET (UG) 2022]



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

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Q.9 An ideal gas follows a process described by the equation $PV^2 = C$ from the initial (P_1, V_1, T_1) to final (P_2, V_2, T_2) thermodynamic states, where C is a constant. Then [NEET (UG) 2022 (Phase 2)]

(1) If $P_1 > P_2$ then $V_1 > V_2$

(2) If $P_1 > P_2$ then $T_1 < T_2$

(3) If $V_2 > V_1$ then $T_2 > T_1$

(4) If $V_2 > V_1$ then $T_2 < T_1$

Solution

Q.10 Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is : [NEET (UG) 2020]

(1) adiabatic (2) isochoric

(3) isobaric (4) isothermal

Scan or tap for the full solution

Q.11 In which of the following processes, heat is neither absorbed nor released by a system? [NEET (UG) 2019]

(1) adiabatic (2) isobaric

(3) isochoric (4) isothermal

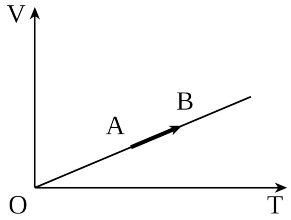
Scan or tap for the full solution

Q.12 A sample of 0.1 g of water at 100°C and normal pressure (1.013×10^5 N m^{-2}) requires 54 cal of heat energy to convert to steam at 100°C. If the volume of the steam produced is 167.1 cc, the change in internal energy of the sample, is [NEET 2018]

(1) 104.3 J (2) 208.7 J (3) 42.2 J (4) 84.5 J

Scan or tap for the full solution

Q.13 The volume (V) of a monatomic gas varies with its temperature (T), as shown in the graph. The ratio of work done by the gas, to the heat absorbed by it, when it undergoes a change from state A to state B, is [NEET 2018]



(1) $\frac{2}{5}$ (2) $\frac{2}{3}$ (3) $\frac{1}{3}$ (4) $\frac{2}{7}$

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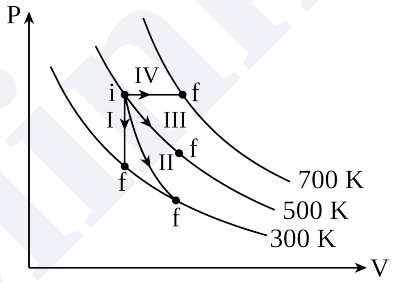
Q.14 The efficiency of an ideal heat engine working between the freezing point and boiling point of water, is [NEET 2018]

(1) 26.8% (2) 20% (3) 6.25% (4) 12.5%

Scan or tap for the full solution

Q.15 Thermodynamic processes are indicated in the following diagram.



Match the following [NEET 2017]

Column-1		Column-2	
a.	Process I	i.	Adiabatic
b.	Process II	ii.	Isobaric
c.	Process III	iii.	Isochoric
d.	Process IV	iv.	Isothermal

(1) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

(2) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

(3) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

(4) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

Solution

Q.16 A Carnot engine having an efficiency of $\frac{1}{10}$ as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is [NEET 2017]

(1) 90 J (2) 99 J (3) 100 J (4) 1 J

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Q.17 A gas is compressed isothermally to half its initial volume. The same gas is compressed separately through an adiabatic process until its volume is again reduced to half. Then [NEET 2016 (Phase 1)]

(1) Compressing the gas isothermally or adiabatically will require the same amount of work.

(2) Which of the case (whether compression through isothermal or through adiabatic process) requires more work will depend upon the atomicity of the gas.

(3) Compressing the gas isothermally will require more work to be done.

(4) Compressing the gas through adiabatic process will require more work to be done.

Scan or tap for the full solution

Q.18 A refrigerator works between 4°C and 30°C. It is required to remove 600 calories of heat every second in order to keep the temperature of the refrigerated space constant. The power required is (Take 1 cal = 4.2 Joules) [NEET 2016 (Phase 1)]

(1) 236.5 W (2) 2365 W

(3) 2.365 W (4) 23.65 W

Scan or tap for the full solution

Q.19 One mole of an ideal monatomic gas undergoes a process described by the equation PV^3 = constant. The heat capacity of the gas during this process is [NEET 2016 (Phase 2)]

(1) $\frac{3}{2}R$ (2) $\frac{5}{2}R$ (3) 2R (4) R

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Q.20 The temperature inside a refrigerator is t_2 °C and the room temperature is t_1 °C. The amount of heat delivered to the room for each joule of electrical energy consumed ideally will be [NEET 2016 (Phase 2)]

(1) $\frac{t_1}{t_1 - t_2}$ (2) $\frac{t_1 + 273}{t_1 - t_2}$

(3) $\frac{t_2 + 273}{t_1 - t_2}$ (4) $\frac{t_1 + t_2}{t_1 + 273}$

Scan or tap for the full solution

Q.21 An ideal gas is compressed to half its initial volume by means of several processes. Which of the process results in the maximum work done on the gas ? [AIPMT 2015]

(1) Isochoric (2) Isothermal

(3) Adiabatic (4) Isobaric

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Q.22 The coefficient of performance of a refrigerator is 5. If the temperature inside freezer is −20°C, the temperature of the surroundings to which it rejects heat is [AIPMT 2015]

(1) 11°C (2) 21°C (3) 31°C (4) 41°C

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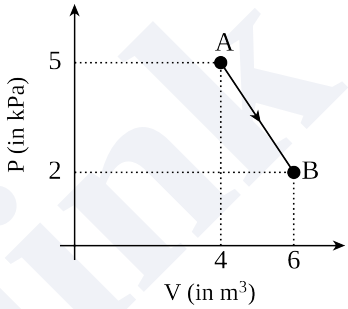
Q.23 A Carnot engine, having an efficiency of $\eta = \frac{1}{10}$ as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is [AIPMT 2015 (Cancelled)]

(1) 90 J (2) 1 J (3) 100 J (4) 99 J

Scan or tap for the full solution

Q.24 One mole of an ideal diatomic gas undergoes a transition from A to B along a path AB as shown in the figure.

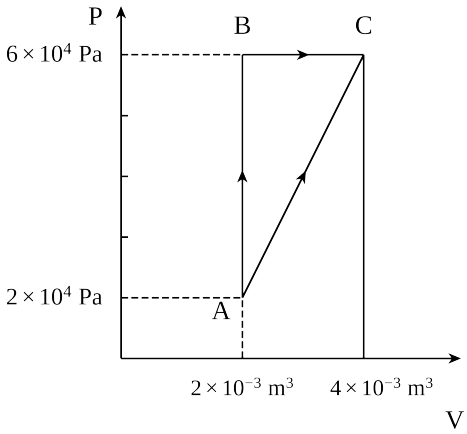


The change in internal energy of the gas during the transition is [AIPMT 2015 (Cancelled)]

(1) 20 J (2) −12 kJ (3) 20 kJ (4) −20 kJ

Scan or tap for the full solution

Q.25 Figure below shows two paths that may be taken by a gas to go from a state A to a state C.



In process AB, 400 J of heat is added to the system and in process BC, 100 J of heat is added to the system. The heat absorbed by the system in the process AC will be [AIPMT 2015 (Cancelled)]

(1) 460 J (2) 300 J (3) 380 J (4) 500 J

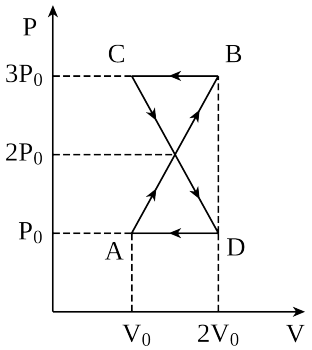
Scan or tap for the full solution

Q.26 A monatomic gas at a pressure P, having a volume V expands isothermally to a volume 2V and then adiabatically to a volume 16V. The final pressure of the gas is (Take $\gamma = 5/3$) [AIPMT 2014]

(1) 64P (2) 32P (3) P/64 (4) 16P

Scan or tap for the full solution

Q.27 A thermodynamic system undergoes cyclic process ABCDA as shown in figure. The work done by the system in the cycle is [AIPMT 2014]



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

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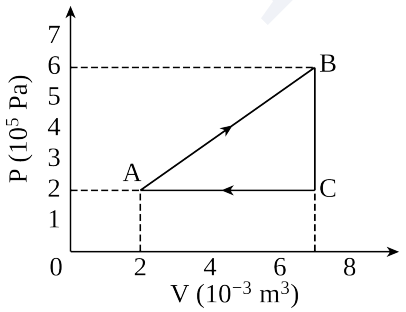
Q.28 The molar specific heats of an ideal gas at constant pressure and volume are denoted by C_p and C_v, respectively. If $\gamma = \frac{C_p}{C_v}$ and R is the universal gas constant, then C_v is equal to [NEET 2013]

(1) $\frac{(\gamma - 1)}{R}$ (2) γR

(3) $\frac{1+\gamma}{1-\gamma}$ (4) $\frac{R}{(\gamma - 1)}$

Scan or tap for the full solution

Q.29 A gas is taken through the cycle A $\longrightarrow$ B $\longrightarrow$ C $\longrightarrow$ A, as shown. What is the net work done by the gas? [NEET 2013]



(1) Zero (2) − 2000 J

(3) 2000 J (4) 1000 J

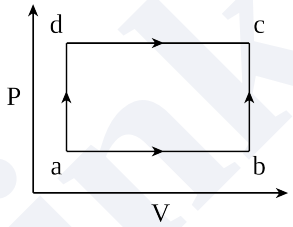
Scan or tap for the full solution

Q.30 During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its temperature. The ratio of $\frac{C_p}{C_v}$ for the gas is [NEET 2013]

(1) $\frac{5}{3}$ (2) $\frac{3}{2}$ (3) $\frac{4}{3}$ (4) 2

Scan or tap for the full solution

Q.31 A system is taken from state a to state c by two paths adc and abc as shown in the figure. The internal energy at a is $U_a = 10$ J. Along the path adc the amount of heat absorbed $dQ_1 = 50$ J and the work obtained $dW_1 = 20$ J whereas along the path abc the heat absorbed $dQ_2 = 36$ J. The amount of work along the path abc is [NEET 2013 (Karnataka)]



(1) 10 J (2) 12 J (3) 36 J (4) 6 J

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Q.32 Which of the following relations does not give the equation of an adiabatic process, where terms have their usual meaning? [NEET 2013 (Karnataka)]

(1) $P^{1-\gamma} T^{\gamma}$ = constant (2) PV^{γ} = constant

(3) $TV^{\gamma-1}$ = constant (4) $P^{\gamma} T^{1-\gamma}$ = constant

Scan or tap for the full solution

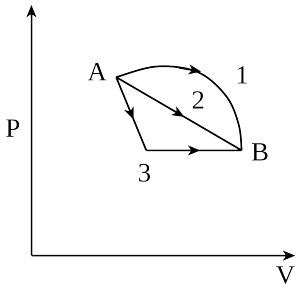
Q.33 Two Carnot engines A and B are operated in series. The engine A receives heat from the source at temperature T_1 and rejects the heat to the sink at temperature T. The second engine B receives the heat at temperature T and rejects to its sink at temperature T_2. For what values of T the efficiencies of the two engines are equal [NEET 2013 (Karnataka)]

(1) $\frac{T_1 - T_2}{2}$ (2) T_1T_2

(3) $\sqrt{T_1T_2}$ (4) $\frac{T_1 + T_2}{2}$

Scan or tap for the full solution

Q.34 An ideal gas goes from state A to state B via three different processes as indicated in the P-V diagram.



If Q_1, Q_2, Q_3 indicate the heat absorbed by the gas along the three processes and ΔU_1, ΔU_2, ΔU_3 indicate the change in internal energy along the three processes respectively, then

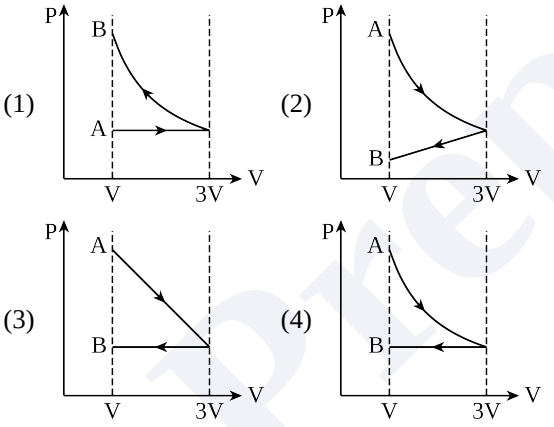
[AIPMT 2012 (Mains)]

(1) $Q_1 > Q_2 > Q_3$ and $\Delta U_1 = \Delta U_2 = \Delta U_3$
(2) $Q_3 > Q_2 > Q_1$ and $\Delta U_1 = \Delta U_2 = \Delta U_3$
(3) $Q_1 = Q_2 = Q_3$ and $\Delta U_1 > \Delta U_2 > \Delta U_3$
(4) $Q_3 = Q_2 = Q_1$ and $\Delta U_1 > \Delta U_2 > \Delta U_3$

Scan or tap for the full solution

Q.35 One mole of an ideal gas goes from an initial state A to final state B via two processes : It first undergoes isothermal expansion from volume V to 3V and then its volume is reduced from 3V to V at constant pressure. The correct P-V diagram representing the two processes is

[AIPMT 2012 (Prelims)]



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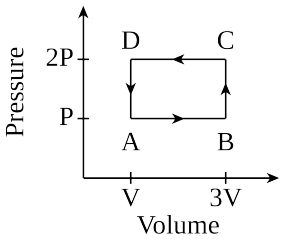
Q.36 A thermodynamic system is taken through the cycle ABCD as shown in figure. Heat rejected by the gas during the cycle is [AIPMT 2012 (Prelims)]



(1) 2PV (2) 4PV (3) $\frac{1}{2}$PV (4) PV

Scan or tap for the full solution

Q.37 A mass of diatomic gas (γ = 1.4) at a pressure of 2 atmospheres is compressed adiabatically so that its temperature rises from 27°C to 927°C. The pressure of the gas in the final state is [AIPMT 2011 (Mains)]

(1) 8 atm (2) 28 atm
(3) 68.7 atm (4) 256 atm

Scan or tap for the full solution

Q.38 During an isothermal expansion, a confined ideal gas does 150 J of work against its surroundings. This implies that [AIPMT 2011 (Prelims)]

(1) 150 J of heat has been removed from the gas
(2) 300 J of heat has been added to the gas
(3) no heat is transferred because the process is isothermal
(4) 150 J of heat has been added to the gas

Scan or tap for the full solution

Q.39 When 1 kg of ice at 0°C melts to water at 0°C, the resulting change in its entropy, taking latent heat of ice to be 80 cal/g, is [AIPMT 2011 (Prelims)]

(1) 273 cal/K (2) 8×10^4 cal/K
(3) 80 cal/K (4) 293 cal/K

Scan or tap for the full solution

Q.40 If c_p and c_v denote the specific heats (per unit mass) of an ideal gas of molecular weight M, then

[AIPMT 2010 (Mains)]

(1) $c_p - c_v = \frac{R}{M^2}$ (2) $c_p - c_v = R$
(3) $c_p - c_v = \frac{R}{M}$ (4) $c_p - c_v = MR$

Scan or tap for the full solution

Q.41 A monatomic gas at pressure P_1 and volume V_1 is compressed adiabatically to $\frac{1}{8}^{th}$ of its original volume. What is the final pressure of the gas?

[AIPMT 2010 (Mains)]

(1) $64P_1$ (2) P_1 (3) $16P_1$ (4) $32P_1$

Scan or tap for the full solution

Q.42 If ΔU and ΔW represent the increase in internal energy and work done by the system respectively in a thermodynamical process, which of the following is true? [AIPMT 2010 (Prelims)]

(1) $\Delta U = -\Delta W$, in an adiabatic process
(2) $\Delta U = \Delta W$, in an isothermal process
(3) $\Delta U = \Delta W$, in an adiabatic process

(4) $\Delta U = -\Delta W$, in an isothermal process

Scan or tap for the full solution

Q.43 The internal energy change in a system that has absorbed 2 kcal of heat and done 500 J of work is [AIPMT 2009]

(1) 6400 J (2) 5400 J (3) 7900 J (4) 8900 J

Scan or tap for the full solution

Q.44 In thermodynamic processes which of the following statements is not true ? [AIPMT 2009]

(1) In an isochoric process pressure remains constant.

(2) In an isothermal process the temperature remains constant.

(3) In an adiabatic process PV^{γ} = constant.

(4) In an adiabatic process the system is insulated from the surroundings.

Scan or tap for the full solution

Q.45 If Q, E and W denote respectively the heat added, change in internal energy and the work done in a closed cyclic process, then [AIPMT 2008]

(1) E = 0 (2) Q = 0

(3) W = 0 (4) Q = W = 0

Scan or tap for the full solution

Q.46 An engine has an efficiency of 1/6. When the temperature of sink is reduced by 62°C, its efficiency is doubled. Temperatures of the source is [AIPMT 2007]

(1) 37°C (2) 62°C (3) 99°C (4) 124°C

Scan or tap for the full solution

Q.47 A Carnot engine whose sink is at 300 K has an efficiency of 40%. By how much should the temperature of source be increased so as to increase its efficiency by 50% of original efficiency? [AIPMT 2006]

(1) 380 K (2) 275 K (3) 325 K (4) 250 K

Scan or tap for the full solution

Q.48 The molar specific heat at constant pressure of an ideal gas is (7/2) R. The ratio of specific heat at constant pressure to that at constant volume is [AIPMT 2006]

(1) 9/7 (2) 7/5 (3) 8/7 (4) 5/7

Scan or tap for the full solution

Q.49 An ideal gas heat engine operates in Carnot cycle between 227°C and 127°C. It absorbs 6×10^4 cal of heat at higher temperature. Amount of heat converted to work is [AIPMT 2005]

(1) 4.8×10^4 cal (2) 6×10^4 cal

(3) 2.4×10^4 cal (4) 1.2×10^4 cal

Scan or tap for the full solution

Q.50 Which of the following processes is reversible? [AIPMT 2005]

(1) Transfer of heat by conduction

(2) Transfer of heat by radiation

(3) Isothermal compression

(4) Electrical heating of a nichrome wire

Scan or tap for the full solution

Q.51 One mole of an ideal gas at an initial temperature of T K does 6R joule of work adiabatically. If the ratio of specific heats of this gas at constant pressure and at constant volume is 5/3, the final temperature of gas will be [AIPMT 2004]

(1) (T + 2.4) K (2) (T − 2.4) K

(3) (T + 4) K (4) (T − 4) K

Scan or tap for the full solution

Q.52 An ideal gas heat engine operates in a Carnot cycle between 227°C and 127°C. It absorbs 6 kcal at the higher temperature. The amount of heat (in kcal) converted into work is equal to [AIPMT 2003]

(1) 4.8 (2) 3.5 (3) 1.6 (4) 1.2

Scan or tap for the full solution

Q.53 The efficiency of Carnot engine is 50% and temperature of sink is 500 K. If temperature of source is kept constant and its efficiency raised to 60%, then the required temperature of sink will be [AIPMT 2002]

(1) 100 K (2) 600 K (3) 400 K (4) 500 K

Scan or tap for the full solution

Q.54 A scientist says that the efficiency of his heat engine which works at source temperature 127°C and sink temperature 27°C is 26%, then [AIPMT 2001]

(1) it is impossible

(2) it is possible but less probable

(3) it is quite probable

(4) data are incomplete.

Solution

Q.55 The (W/Q) of a Carnot engine is $\frac{1}{6}$, now the temperature of sink is reduced by 62°C, then this ratio becomes twice, therefore the initial temperature of the sink and source are respectively

[AIPMT 2000]

(1) 33°C, 67°C (2) 37°C, 99°C

(3) 67°C, 33°C (4) 97 K, 37 K

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**2**	**4**	**4**	**4**	**1**	**4**	**4**	**2**	**4**	**1**	**1**
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	**2**	**1**	**1**	**1**	**1**	**4**	**1**	**4**	**2**	**3**	**3**
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	**1**	**4**	**1**	**3**	**4**	**4**	**4**	**2**	**4**	**4**	**3**
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	**1**	**4**	**1**	**4**	**4**	**4**	**3**	**4**	**1**	**3**	**1**
Ques.	45	46	47	48	49	50	51	52	53	54	55
Ans.	**1**	**3**	**4**	**2**	**4**	**3**	**4**	**4**	**3**	**1**	**2**

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