NCERT EXEMPLAR PROBLEMS

1. An ideal gas undergoes four different processes from the same initial state as shown in P-V diagram. Four process are adiabatic, isothermal, isobaric and isochoric.

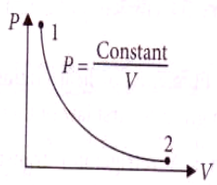
Out of 1,2,3 and 4 which one is adiabatic?

a) 4 b) 3
c) 2 d) 1

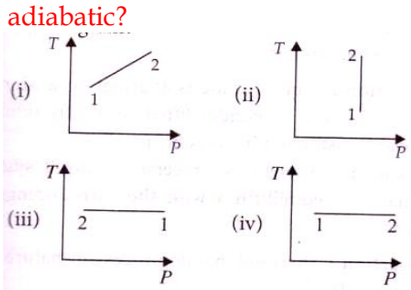
2. If an average person jogs, he produces $14.5\times10^4 cal\,\min^{-1}$. This is removed by the evaporation of sweat. The amount of sweat evaporated pre minute (assuming 1 kg requires $580\times10^3 cal$ for evaporation) is

a) 0.25 kg b) 2.25kg
c) 0.05 kg d) 0.20 kg

3. Consider P.V diagram for an ideal gas shown is figure

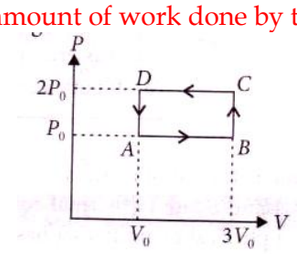


Out of the 1,2,3 and 4 which one is adiabatic?



a) (iv) b) ii)
c) (iii) d) (i)

4. An ideal gas undergoes cyclic process ABCDA as shown in given P.V diagram. The amount of work done by the gas is



a) $6p_0V_0$ b) $-2P_0V_0$
c) $+2P_0V_0+2$ d) $+4P_0V_0$

5. Consider two containers A and B containing identical gases at the same pressure, volume and temperature. The gas in container A is compressed to half of its original volume isothermally while the gas in container B is compressed to half of its original value adiabatically . The ratio of final pressure of gas in B to that of gas in A is

a) $2\gamma^{-1}$ b) $\left(\frac{1}{2}\right)^{\gamma-1}$
c) $\left(\frac{1}{1-\gamma}\right)^2$ d) $\left(\frac{1}{\gamma-1}\right)^2$

6. Three copper blocks of masses M_1, M_2 and M_3 kg respectively are borough into thermal contact till they reach equilibrium. Before contact, they were at $T_1, T_2, T_3 (T_1 > T_2 > T_3)$. Assuming there is no heat loss to the surroundings, the equilibrium temperature T is (s is specific heat of copper)

a) $T = \frac{T_1+T_2+T_3}{3}$

b) $T = \frac{M_1T_1+M_2T_2+M_3T_3}{M_1+M_2+M_3}$

c) $T = \frac{M_1T_1+M_2T_2+M_3T_3}{3(M_1+M_2+M_3)}$

d) $T = \frac{M_1T_1s+M_2T_2s+M_3T_3s}{M_1+M_2+M_3}$

ASSERTION & REASON CORNER

Directions : In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false
d) If both assertion and reason are false

1. **Assertion:** The zeroth law said that, when two systems A and B, are in thermal equilibrium, there must be physical quantity that has the same value for both
Reason: The physical quantity which is same for both system is temperature.

2. **Assertion:** When a bullet is fired from a gun, the bullet pierces a wooden block and stops, changing the temperature of the bullet and the surrounding layers of wood.
Reason: Temperature is related to the energy of motion of the bullet as a whole.

3. **Assertion:** First law of thermodynamics does not forbid flow of heat from lower

temperature to higher temperature to higher temperature
Reason: Heat supplied to a system is always equal to the increase in its internal energy.

4. **Assertion:** A constant volume gas thermometer, reads temperature in terms of pressure.
Reason: In this case a plot of pressure versus temperature gives a straight line.
5. **Assertion:** The isothermal curves intersect each other at a certain point.
Reason: The isothermal changes takes place rapidly, so the isothermal curves has very little slope
6. **Assertion**: In an isothermal expansion, the gas absorbs heat and does work while in an isothermal compression, work is done on the gas by the environment and heat is released.
Reason: In an isothermal process, there is no change in thermal energy of an ideal gas
7. **Assertion:** In an adiabatic process, change in internal energy is equal to work done on or by the gas in the process.
Reason: The temperature remains constant in an adiabatic process.
8. **Assertion**: The temperature of a gas does not change, when it undergoes on adiabatic process.
Reason: During energy is exchanged between a system and surroundings
9. **Assertion:** In an isolated system, the entropy increases
Reason: The process in an isolated system are adiabatic.
10. **Assertion:** A heat engine is the reverse of a refrigerator
Reason : A refrigerator cannot work without some external work done on the system.
11. **Assertion**: The efficiency of a heat engine can never be unity
Reason: Efficiency of heat engine is fundamental limitation given by first law of thermo dynamics .
12. **Assertion:** A refrigerator transfers heat from a lower temperature to a higher temperature
Reason: Heat cannot flow from a lower temperature to higher temperature.
13. **Assertion:** A quasi-static isothermal expansions of an ideal gas in a cylinder fitted with a frictionless movable piston is irreversible process.
Reason: A process in irreversible only if system remains in equilibrium with the surroundings at every stage
14. **Assertion**: Thermodynamic process in nature are irreversible .
Reason: Dissipative effects cannot be eliminated.
15. **Assertion:** No engine can have efficiency greater than that of the cannot engine
Reason: The efficiency of a cannot engine is given by $\eta = 1 - \frac{T_2}{T_1}$

MCQs CORNER

KEY

1. D)	2. D)	3. A)	4. D)	5. D)
6. B)	7. B)	8. C)	9. D)	10. A)
11. C)	12. C)	13. A)	14. B)	15. A)
16. C)	17. A)	18. A)	19. A)	20. C)
21. B)	22. B)	23. C)	24. A)	25. C)
26. C)	27. A)	28. A)	29. C)	30. A)
31. C)	32. C)	33. A)	34. A)	35. C)
36. A)	37. C)	38. C)	39. C)	40. D)
41. B)	42. A)	43. B)	44. D)	45. A)
46. A)	47. B)	48. D)	49. B)	50. B)
51. C)	52. D)	53. C)	54. C)	55. D)
56. A)	57. B)	58. B)	59. B)	60. D)
61. C)	62. B)	63. B)	64. A)	65. D)
66. D)	67. C)	68. A)	69. D)	70. C)
71. B)	72. C)	73. C)	74. A)	75. C)
76. B)	77. A)	78. A)	79. D)	80. A)
81. A)	82. B)	83. B)	84. D)	85. B)
86. B)	87. B)	88. A)	89. D)	90. C)
91. D)	92. D)	93. A)	94. B)	95. B)
96. C)	97. B)	98. B)	99. C)	100. C)

HOTS

1. D)	2. B)	3. B)	4. C)	5. D)
6. C)	7. D)	8. A)		

NCERT EXEMPLAR PROBLEMS

1. C)	2. A)	3. C)	4. B)	5. A)
6. B)				

ASSERTION & REASON CORNER

1. A)	2. C)	3. B)	4. A)	5. D)
6. A)	7. D)	8. D)	9. B)	10. A)
11. C)	12. B)	13. D)	14. A)	15. B)