RK VISION ACADEMY

PHYSICS

XI – THERMODYNAMICS

SECTION A

1. **The internal energy of an ideal gas depends upon**
   (1) Specific volume
   (2) Pressure
   (3) Temperature
   (4) Density

2. **Heat given to a system is 35 joules and work done by the system is 15 joules. The change in the internal energy of the system will be**
   (1)– 50 J
   (2)20 J
   (3)30 J
   (4)50 J

3. **A thermodynamic system goes from states (i) P_1, V to $2P_1$, V (ii) P, V to P, 2V. Then work done in the two cases is**
   (1) Zero, Zero
   (2) Zero, PV_1
   (3) PV_1, Zero
   (4) PV_1 , P_1V_1

4. **Work done on or by a gas, in general depends upon the**
   (1) Initial state only
   (2) Final state only
   (3) Both initial and final states only
   (4) Initial state, final state and the path

5. **Find the change in internal energy of the system when a system absorbs 2 kilocalorie of heat and at the same time does 500 joule of work**
   (1) 7900 J
   (2) 8200 J
   (3) 5600 J
   (4) 6400 J

6. **110 J of heat is added to a gaseous system, whose internal energy change is 40 J, then the amount of external work done is**
   (1) 150 J
   (2) 70 J
   (3) 110 J
   (4) 40 J

7. **When the amount of work done is 333 cal and change in internal energy is 167 cal, then the heat supplied is**
   (1) 166 cal
   (2) 333 cal
   (3) 500 cal
   (4) 400 cal

8. **The state of a thermodynamic system is represented by**
   (1) Pressure only
   (2) Volume only
   (3) Pressure, volume and temperature
   (4) Number of moles

9. **A vessel containing 5 litres of a gas at 0.8 m pressure is connected to an evacuated vessel of volume 3 litres. The resultant pressure inside will be (assuming whole**

system to be isolated)

(1) 4/3 m

(2) 0.5 m

(3) 2.0 m

(4) 3/4 m

10. The isothermal Bulk modulus of an ideal gas at pressure P is

(1) P

(2) γP

(3) P / 2

(4) P / γ

11. The specific heat of a gas in an isothermal process is

(1) Infinite

(2) Zero

(3) Negative

(4) Remains constant

12. When an ideal gas in a cylinder was compressed isothermally by a piston, the work done on the gas was found to be 1.5×10^4 joules. During this process about

(1) 3.6×10^3 cal of heat flowed out from the gas

(2) 3.6×10^3 cal of heat flowed into the gas

(3) 1.5×10^4 cal of heat flowed into the gas

(4) 1.5×10^4 cal of heat flowed out from the gas

13. If a cylinder containing a gas at high pressure explodes, the gas undergoes

(1) Reversible adiabatic change and fall of temperature

(2) Reversible adiabatic change and rise of temperature

(3) Irreversible adiabatic change and fall of temperature

(4) Irreversible adiabatic change and rise of temperature

14. The work done in an adiabatic change in a gas depends only on

(1) Change is pressure

(2) Change is volume

(3) Change in temperature

(4) None of the above

15. An ideal gas at 27°C is compressed adiabatically to 8/27 of its original volume. If $\gamma=5/3$, then the rise in temperature is

(1) 450 K

(2) 375 K

(3) 225 K

(4) 405 K

16. The amount of work done in an adiabatic expansion from temperature T to is

(1) $R(T-T_1)$

(2) $R/(\gamma-1)(T-T_1)$

(3) RT

(4) $R(T-T_1)(\gamma-1)$

17. For adiabatic processes ($\gamma=Cp/Cv$)

(1) $P^\gamma V$ = constant

(2) $T^\gamma V$ = constant

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

(4) TV^γ = constant

18. During the adiabatic expansion of 2 moles

of a gas, the internal energy was found to have decreased by 100 J. The work done by the gas in this process is

(1) Zero

(2) –100 J

(3) 200 J

(4) 100 J

19. For adiabatic process, wrong statement is

(1) dQ=0

(2) dU=-dW

(3) Q = constant

(4) Entropy is not constant

20. When heat in given to a gas in an isobaric process, then

(1) The work is done by the gas

(2) Internal energy of the gas increases

(3) Both (1) and (2)

(4) None from (1) and (2)

21. A gas is compressed at a constant pressure of $50N/m^2$ from a volume of $10m^3$ to a volume of $4m^3$. Energy of 100 J then added to the gas by heating. Its internal energy is

(1) Increased by 400 J

(2) Increased by 200 J

(3) Increased by 100 J

(4) Decreased by 200 J

22. Which of the following is correct in terms of increasing work done for the same initial and final state

(1) Adiabatic < Isothermal < Isobaric

(2) Isobaric < Adiabatic < Isothermal

(3) Adiabatic < Isobaric < Isothermal

(4) None of these

23. A Carnot engine has an efficiency of 50% when its source is at a temperature 327°C. The temperature of the sink is

(1) 200°C

(2) 27°C

(3) 15°C

(4) 100°C

24. The work done in which of the following processes is zero

(1) Isothermal process

(2) Adiabatic process

(3) Isochoric process

(4) None of these

25. An ideal gas heat engine operates in a Carnot's cycle between 227^oC and 127^oC. It absorbs 6×10^4 J at high temperature. The amount of heat converted into work is

(1) 4.8×10^4 J

(2) 3.5×10^4 J

(3) 1.6×10^4 J

(4) 1.2×10^4 J

26. An ideal heat engine exhausting heat at 77^oC is to have a 30% efficiency. It must take heat at

(1) 127^oC

(2) 227^oC

(3) 327 ^oC

(4) 673^oC

27. The temperature of sink of Carnot engine is 27°C. Efficiency of engine is 25%. Then temperature of source is

(1) 227 °C

(2) 327 °C

(3) 127 °C

(4) 27 °C

28. Work done by 0.1 mole of a gas at 27°C to double its volume at constant pressure is ($R = 2$ cal $mol^{-1o} C^{-1}$)

(1) 54 cal

(2) 600 cal

(3) 60 cal

(4) 546 cal

29. During an adiabatic expansion of 2 moles of a gas, the change in internal energy was found –50J. The work done during the process is

(1) Zero

(2) 100J

(3) – 50J

(4) 50J

30. The temperature of reservoir of Carnot's engine operating with an efficiency of 70% is 1000K. The temperature of its sink is

(1) 300 K

(2) 400 K

(3) 500 K

(4) 700 K

31. A mono atomic gas is supplied the heat Q very slowly keeping the pressure constant. The work done by the gas will be

(1) 2/3 Q

(2) 3/5 Q

(3) 2/5 Q

(4) 1/5 Q

32. The molar heat capacity in a process of a diatomic gas if it does a work of Q/4 when a heat of Q is supplied to it is

(1) 2/5 R

(2) 5/2 R

(3) 10/3 R

(4) 6/7 R

33. The volume of air increases by 5% in its adiabatic expansion. The percentage decrease in its pressure will be

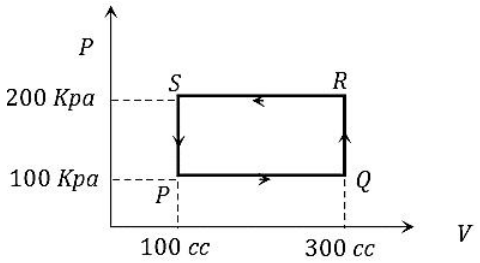
(1) 5%

(2) 6%

(3) 7%

(4) 8%

34. A thermodynamic system is taken through the cycle PQRSP process. The net work done by the system is



(1) 20 J

(2) – 20 J

(3) 400 J

(4) – 374 J

35. A gas is suddenly compressed to 1/4 th of

its original volume at normal temperature. The increase in its temperature is (γ=1.5)

(1) 273 K

(2) 573 K

(3) 373 K

(4) 473 K

SECTION B

36. In adiabatic expansion

(1) $\Delta U=0$

(2) ΔU=negative

(3) ΔU=positive

(4) ΔW=zero

37. How much work to be done in decreasing the volume of and ideal gas by an amount of 2.4×10^{-4} m^3 at normal temperature and constant normal pressure of 1×10^5 N/m^2

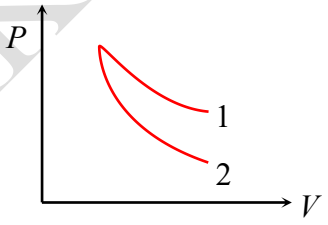
(1) 28 joule

(2) 27 joule

(3) 25 joule

(4) 24 joule

38. P-V plots for two gases during adiabatic process are shown in the figure. Plots 1 and 2 should correspond respectively to



(1) He and

(2) O_2 and He

(3) He and Ar

(4) O_2 and N_2

39. Assertion : The internal energy of an isothermal process does not change.
Reason: The internal energy of a system depends only on pressure of the system

(1) If both assertion and reason are true and the reason is the correct explanation of the assertion

(2) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(3) If assertion is true but reason is false.

(4) If the assertion and reason both are false

40. In which of the following processes, heat is neither absorbed nor released by a system

(1) Isothermal

(2) Adiabatic

(3) Isobaric

(4) Isochoric

41. The slopes of isothermal and adiabatic curves are related as

(1) Isothermal curve slope = adiabatic curve slope

(2) Isothermal curve slope = $\gamma\times$ adiabatic curve slope

(3) Adiabatic curve slope = $\gamma\times$ isothermal curve slope

(4) Adiabatic curve slope = 1/2×isothermal curve slope

42. Work done by air when it expands from 50 litres to 150 litres at a constant pressure of 2 atmosphere is

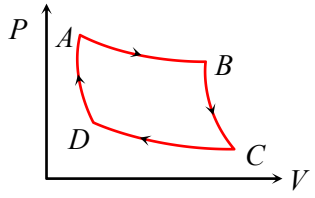
(1) 2×10^4 joules

(2) 2×100 joules

(3) $2\times10^{5}\times100$joules

(4) $2\times10^{-5}\times100$joules

43. The P-V graph of an ideal gas cycle is shown here as below. The adiabatic process is described by



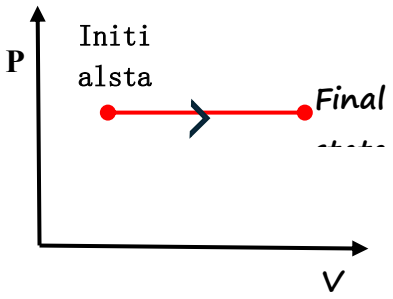
(1) AB and BC

(2) AB and CD

(3) BC and DA

(4) BC and CD

44. The P-V diagram for an ideal gas in a piston cylinder assembly undergoing a thermodynamic process is shown in the figure. The process is



(1) Isochoric

(2) Isobaric

(3) Isothermal

(4) Adiabatic

45. A cycle tyre bursts suddenly. This represents an

(1) Isothermal process

(2) Isobaric process

(3) Isochoric process

(4) Adiabatic process

46. The efficiency of a carnot engine depends upon

(1) The temperatures of the source and sink

(2) The volume of the cylinder of the engine

(3) The temperature of the source only

(4) The temperature of the sink only

47. Assertion: In adiabatic compression, the internal energy and temperature of the system get decreased.

Reason: The adiabatic compression is a slow process

(1) If both assertion and reason are true and the reason is the correct explanation of the assertion

(2) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(3) If assertion is true but reason is false.

(4) If the assertion and reason both are false

48. The work done in which of the following processes is zero

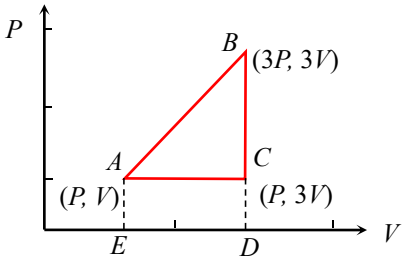
(1) Isothermal process

(2) Adiabatic process

(3) Isochoric process

(4) None of these

49. An ideal gas is taken around ABCA as shown in the above P-V diagram. The work done during a cycle is



(1) 2PV

(2) PV

(3) 1/2PV

(4) Zero

50. A Carnot engine takes 3×10^6cal. of heat from a reservoir at 627°C, and gives it to a sink at 27°C. The work done by the engine is

(1) 4.2×10^6J

(2) 8.4×10^6J

(3) 16.8×10^6J

(4) Zero

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PHYSICS

XI – THERMODYNAMICS

SECTION A

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3. 2
4. 4
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6. 2
7. 3
8. 3
9. 2
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11. 1
12. 1
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14. 3
15. 2
16. 2
17. 3
18. 4
19. 4
20. 3
21. 1
22. 1
23. 2
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SECTION B

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