Thermodynamics – Exam 1 (NEET)

System, Properties, Process, First Law

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Q1. Identify the intensive property
Conceptual Approach

Extensive property $\propto$ amount of matter (volume, mass, enthalpy). Intensive property independent of matter (T, P, density).

Final Answer: Temperature (Option d).

Q2. Identify extensive property
Conceptual Approach

Extensive $\rightarrow$ depends on system size (enthalpy, volume, heat capacity). Intensive $\rightarrow$ concentration, density, viscosity.

Final Answer: Enthalpy (Option a).

Q3. Adiabatic relation
Conceptual Approach

Adiabatic process $\rightarrow q = 0$. ΔE may change due to work.

Final Answer: Option (c) $q = 0$.

Q4. Combustion in Adiabatic vs Diathermic
Conceptual Approach

Adiabatic container $\rightarrow$ heat trapped $\rightarrow$ temperature rises. Diathermic container $\rightarrow$ heat escapes $\rightarrow$ no rise.

Final Answer: Option (a).

Q5. Expansion in vacuum (free expansion)
Conceptual Approach

Free expansion $\rightarrow w = 0$, so work $= 0$.

Final Answer: Zero (Option d).

Q6. Which is not thermodynamic property?
Conceptual Approach

State functions: U, H, P, T. Work w is path function $\rightarrow$ not property.

Final Answer: Option (d) w.

Q7. Maximum work condition
Conceptual Approach

Maximum work when expansion is reversible (small opposing pressure). Among given, against low external pressure $\rightarrow$ max.

Final Answer: Option (c).

Q8. Cyclic internal energy
Conceptual Approach

Internal energy is state function. Returning to same state $\rightarrow \Delta U = 0$.

Final Answer: Option (d).

Q9. Pair of extensive properties
Conceptual Approach

Extensive = volume, heat capacity. Intensive = T, P, density, viscosity.

Final Answer: Option (d).

Q10. Heat = 20 kJ, Work = 10 kJ
Conceptual Approach

First law: $\Delta U = q - w = 20 - 10$.

Final Answer: $\Delta U = 10$ kJ $\uparrow$ (Option a).

Q11. $q = 300$ cal, $w = 200$ cal
Conceptual Approach

$\Delta U = q - w = 300 - 200$.

Final Answer: 100 cal (Option c).

Q12. Isothermal expansion (1 L $\rightarrow$ 10 L)
Conceptual Approach

Isothermal $\rightarrow \Delta U = 0$.

Final Answer: Zero (Option b).

Q13. Thermodynamic state function
Conceptual Approach

State function independent of path, depends only on initial final state.

Final Answer: Option (b).

Q14. $w = 500$ cal (by system), $q = +300$ cal
Conceptual Approach

$\Delta U = q - w = 300 - 500 = -200.$

Final Answer: –200 cal (Option a).

Q15. Path variable
Conceptual Approach

Heat Work are path functions. U, H, V are state functions.

Final Answer: Heat q (Option c).

Q16. Work = 200 J, Heat = 150 J
Conceptual Approach

$\Delta U = q - w = 150 - 200 = -50.$ Magnitude = 50 J.

Final Answer: 50 J (Option c).

Q17. Free expansion 1 L → 20 L
Conceptual Approach

Free expansion $\rightarrow q = 0, w = 0.$

Final Answer: Zero (Option a).

Q18. $q = 300$ J at constant volume
Conceptual Approach

Constant volume $\rightarrow w = 0$, so $\Delta U = q = 300.$

Final Answer: 300 J (Option a).

Q19. Assertion – Reason (Adiabatic)
Conceptual Approach

Adiabatic: $q = 0$ (True). Reason: "no temp change" is wrong (temp may change).

Final Answer: Option (c) – Assertion true, Reason false.

Q20. Open / Closed system examples
Conceptual Approach

Open → exchange matter + energy. Closed → only energy exchange. Isolated → neither.

Final Answer: (c) Closed vessel (copper).

Q21. Free expansion adiabatic
Conceptual Approach

Free expansion: $w = 0$. Adiabatic: $q = 0$. Ideal gas: $\Delta T = 0$.

Final Answer: Option (c).

Q22. Process without heat exchange
Conceptual Approach

No heat exchange → Adiabatic.

Final Answer: Option (b) Adiabatic.
