

Thermodynamics

15 Multiple-Choice Questions on Internal Energy

1. Internal energy (U) is:

- (a) The total energy of particles in a system including kinetic and potential energy.
- (b) Only the potential energy of particles.
- (c) The energy of a system at absolute zero.
- (d) The energy required to perform work.

2. Which of the following represents the First Law of Thermodynamics?

- (a) $q = w$
- (b) $\Delta U = q + w$
- (c) $P\Delta V = w$
- (d) $\Delta U = w - q$

3. Internal energy is a:

- (a) Path function
- (b) Process-dependent property
- (c) State function
- (d) Dependent only on temperature

4. When heat is added to a system and no work is done, the internal energy:

- (a) Remains constant
- (b) Decreases
- (c) Increases
- (d) Becomes zero

5. In a thermodynamic process, if $q = 50\text{ J}$ and $w = -20\text{ J}$, what is ΔU ?

- (a) $+70\text{ J}$
- (b) $+30\text{ J}$
- (c) -70 J
- (d) -30 J

6. Which of these systems can exchange both energy and matter with surroundings?

- (a) Closed system
- (b) Open system
- (c) Isolated system
- (d) Adiabatic system

7. Internal energy change in a system depends on:

- (a) Path taken by the process
- (b) Initial and final states of the system
- (c) Heat supplied only
- (d) Work done only

8. If a gas is compressed, the work done on the system is:

- (a) Positive
- (b) Negative

- (c) Zero
- (d) Undefined

9. The energy transferred as heat always flows from:

- (a) Low to high temperature
- (b) High to low temperature
- (c) The system to surroundings only
- (d) Surroundings to system only

10. During an isothermal expansion of an ideal gas, ΔU :

- (a) Increases
- (b) Decreases
- (c) Remains constant
- (d) Becomes zero

11. The work done during the expansion of a gas at constant pressure is given by:

- (a) $w = -P\Delta T$
- (b) $w = -P\Delta V$
- (c) $w = -\Delta U$
- (d) $w = P\Delta V$

12. Internal energy of an ideal gas depends only on:

- (a) Volume
- (b) Pressure
- (c) Temperature
- (d) Both temperature and volume

13. In an isolated system, the change in internal energy is:

- (a) Positive
- (b) Negative
- (c) Zero
- (d) Depends on the work done

14. When a system does work on its surroundings, the work (w) is:

- (a) Positive
- (b) Negative
- (c) Zero
- (d) Equal to heat absorbed

15. If the volume of a system remains constant during a process:

- (a) No work is done
- (b) Work is positive
- (c) Work is negative
- (d) Internal energy remains unchanged