

# Physics - Thermodynamics

Topics : [Computer engineering](#)

Written on [March 18, 2024](#)

## 1. Thermodynamics:

Thermodynamics is the branch of physics that deals with the relationships between heat, work, and energy, as well as the properties of substances and their transformations.

## 2. Laws of Thermodynamics:

- **Zeroth Law:** If two systems are in thermal equilibrium with a third system, they are in thermal equilibrium with each other. This law establishes the concept of temperature and allows the definition of temperature scales.
- **First Law (Law of Conservation of Energy):** Energy cannot be created or destroyed; it can only change forms. The total energy of an isolated system remains constant. Mathematically, it is expressed as  $\Delta U = Q - W$ , where  $\Delta U$  is the change in internal energy,  $Q$  is the heat added to the system, and  $W$  is the work done by the system.
- **Second Law (Law of Entropy):** The entropy of an isolated system always increases or remains constant over time. It implies that not all the energy supplied to a system can be converted into work. It also defines the direction of spontaneous processes.

## 3. Thermodynamic Processes:

- **Isothermal Process:** A process that occurs at constant temperature.
- **Adiabatic Process:** A process that occurs without the transfer of heat between the system and its surroundings.
- **Isobaric Process:** A process that occurs at constant pressure.
- **Isochoric Process (Isometric Process):** A process that occurs at constant volume.

## 4. Thermodynamic Systems:

- **Closed System:** A system that can exchange energy but not matter with its surroundings.
- **Open System:** A system that can exchange both energy and matter with its surroundings.
- **Isolated System:** A system that cannot exchange energy or matter with its surroundings.

## 5. Applications:

- Thermodynamics has applications in various fields such as engineering, chemistry,

biology, and environmental science.

- It is used in the design and analysis of engines, refrigeration systems, power plants, and chemical processes.

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