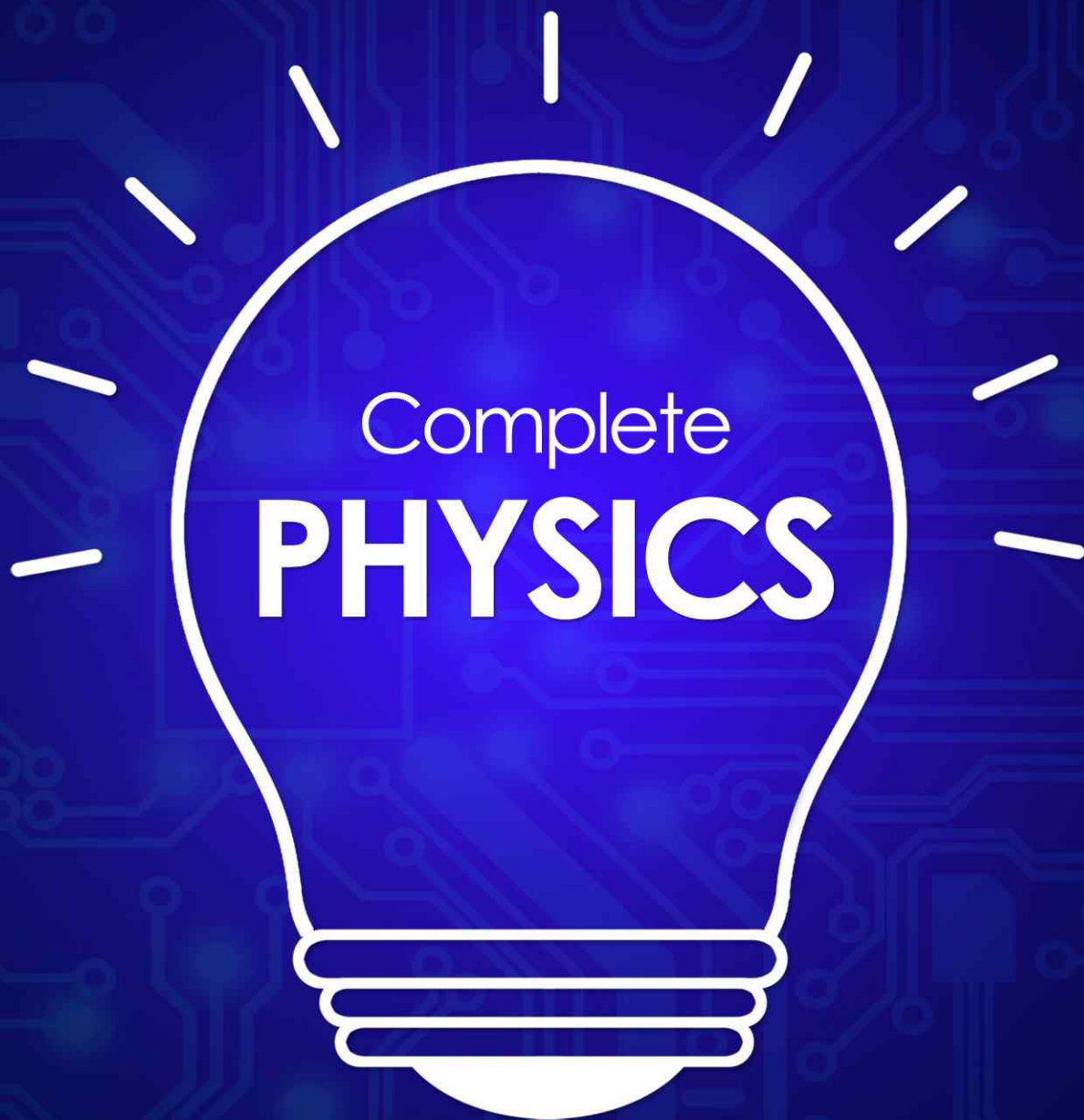




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CLASS 11th

Thermodynamics

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01. Thermal Equilibrium and Temperature

Two systems are said to be in thermal equilibrium with each other, if they are at the same temperature.

02. Zeroth Law of Thermodynamics

It states that if two systems A and B are in thermal equilibrium with a third system C, then A and B must be in thermal equilibrium with each other.

03. A Few Definitions

(i) Thermodynamic System

An assembly of extremely large number of particles having a certain value of pressure, volume and temperature is called a thermodynamic system. For example, a large collection of gas molecules is a thermodynamic system.

(ii) Thermodynamic Variables

The variables which determine the thermodynamic behaviour of a system are called thermodynamic variables. The quantities like pressure (P), volume (V) and temperature (T) are thermodynamic variables. There are some other thermodynamic variables, such as internal energy (U), entropy (S), etc. All other thermodynamic variables can be expressed in terms of P, V and T.

(iii) Equation of State

A relation between pressure, volume and temperature for a system is called its equation of state. The state of a system is completely known in terms of its pressure, volume and temperature.

For example, for 1 mole of an ideal gas, the equation of state is

$$PV = RT$$

In a simple system, such as a gas contained in a cylinder, any two variables out of the three variables P, V and T determine the state of the system. The third variable can be known by using the equation of state.

(iv) Thermodynamic process

A thermodynamic process is said to be taking place, if the thermodynamic variables of the system change with time.

In practice, the following types of thermodynamic processes can take place :

- Isothermal Process** : *A thermodynamic process that takes place at constant temperature is called isothermal process.*
- Isobaric Process** : *A thermodynamic process that takes place at constant pressure is called isobaric process.*
- Isochoric Process** : *A thermodynamic process that takes place at constant volume is called isochoric process.*
- Adiabatic Process** : *A thermodynamic process in which no heat enters or leaves the system is called adiabatic process.*