

# Laws of Thermodynamics

## **Zeroth Law of Thermodynamics**

1) The zeroth law of thermodynamics states that if two thermodynamic systems are each in thermal equilibrium with a third, then they are in thermal equilibrium with each other.

**or**

2) Zeroth law of thermodynamics states that two systems, which are individually in thermal equilibrium with a third one, are also in thermal equilibrium with each other.

## **First Law of Thermodynamics**

1) Energy can neither be created nor destroyed. It can only be changed from one form to another.

2) First law of thermodynamics states that the amount of heat energy supplied to a system is equal to the sum of the change in internal energy of the system and the work done by the system. This law is in accordance with the law of conservation of energy.

## **Second Law of Thermodynamics**

### **1) Kelvin's statement**

Kelvin's statement of second law is based on his experience about the performance of heat engine. It is impossible to obtain a continuous supply of work from a body by cooling it to a temperature below the coldest of its surroundings.

### **2) Clausius statement**

It is impossible for a self acting machine unaided by any external agency to transfer heat from a body at a lower temperature to another body at a higher temperature.

### **3) Kelvin - Planck's statement**

It is impossible to construct a heat engine operating in a cycle, that will extract heat from a reservoir and perform an equivalent amount of work.