THERMODYNAMICS

1. **Thermal equilibrium**
2. **Zeroth law of thermodynamics**
3. **Heat, internal energy and work**
4. **First law of thermodynamics, Isothermal and adiabatic processes**
5. **Second law of thermodynamics, reversible and irreversible processes**
6. **Heat engines and Refrigerators**

- **Thermodynamicalsystem** : An assemnbly of externely large number of gas molecules is called a themodynamical system. The pressure P, volume V, temperate T and heat cotent Q are called Therodynamical parameters.

- **Zeroth Law of Themodynamics** : (Concept of temperate) According to this law, when themodynamics systems A and B are separately in thermal equilibrium with a third themodynamicsytem C, then the systems A and B are in themal equilibrium with each other also.

Internal Energy of a Gas is the sum of kinetic energy and the potential energy of the molecules of the gas.

$K.E./molecule = \frac{1}{2}mc^2 = \frac{3}{2}kT$ where K is Boltzman's constant. Internal energy of an ideal gas is wholly kinetic.

- First Law of Thermodynamics (principle of conversation of energy) According of this law dQ = dU+dW Where dQ is the small amount of heat energy exchange with a system, dU is small change in internal energy of the system and dW is the small external work done by or on the system.

- Second Law of Themodynamics: It is impossible for self acting machine, unaided by an external agency to convey heat from the body at lower temputre to another at higher temperature. This statement of the law was made by Clausius.

- According to Kelvin, it is impossible to derive a continuous supply of work by cooling a body to a temperature lower than that of the coldest of its surroundings.

- Heat Engines : A heat engine is a divice which converts heat energy into mechanical energy. Efficiency of a heat engine is the ratio of work done (W) by the engine per cycle of the energy absorbed from the source Q_1 per cycle.

$$n = \frac{w}{Q_1} = \frac{Q_1 - Q_2}{Q_1} = 1 - \frac{Q_2}{Q_1} \quad where \ Q_2 = \text{heat rejected to the sin k}$$