B.Sc (Part-3)

Statistical Mechanics

Some Important Terms (part 1)

By

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Some Important Terms

Mean free time

The mean time which a molecule travels before suffering its next collision.

Mean free path

The mean distance which a molecule travels before suffering its next collision.

Total scattering cross section

The effective area determining the probability that a molecule incident on another molecule will be scattered by it.

Stress

Force per unit area.

Phase

A particular form of aggregation of the molecules of a substance.

Engine

A device used to convert the internal energy of a system into work.

Postulate of equal a priori probabilities

An isolated system in equilibrium is equally likely to be in any of its accessible states.

The same postulate is made in classical mechanics where state refers to a cell in phase space.

That is, phase space is sub divider into small cells of equal size, than an isolated system in equilibrium is equally likely to be in any of its accessible cells.

Density of states

It is number of states per unit energy range.

Canonical distribution

An ensemble systems all of which are in contact with heat reservoir of known temperature is called a canonical ensemble.

canonical distribution The probability distribution according to which the probability P_r of finding a system in a state r of energy E_r is given by

$$P_r \propto e^{-\beta E_r}$$

where $\beta = (kT)^{-1}$ is the absolute temperature parameter of the heat reservoir with which the system is in equilibrium.

Absolute temperature

The absolute temperature of a macroscopic of a macroscopic is defined by

$$\frac{1}{kT} \equiv \beta \equiv \frac{\partial \ln \Omega}{\partial E}$$

References:-

- Statistical physics berkeley physics course volume 5 By F. Reif