Date __/__/____

Unit - 5

* Macrostate and Microstate:-

> Microstate:→ A microstate of the system is defined as a state for which the motions of the individual particles are completely specified. In general, the overall energy of a given microstate, r, is a function of the external parameters:

$$E_r = E_r(x_1, x_2 \cdots x_n).$$

> Macrostate:- A macrostate of the system is defined by specifying the external parameters, and any other constraints to which the system is subject.

for Example:- if we are dealing with an isolated system then the macrostate might be specified by given the values of the volume and constant energy.

Now there are generally a large number of microstate that are consistent with a given macrostate.

Example

System A

1 x_1	2 x_2	3 x_3	4 x_4
5 x_5	6 x_6	7 x_7	8 x_8
9 x_9	10 x_{10}	11 x_{11}	12 x_{12}

in cell 1, particle x_1 (position)
in cell 2, particle x_2
⋮
in cell 12, particle x_{12} (position)

total No. of particle $(x_1, x_2 \cdots x_{12})$ are called microstate of system A. and are located in system A called Macrostate.

Page No.

Date ___/___/_____

⊛ Phase space:→

if a thermodynamic system consists of N particle, and each particle is associated with three position variables and three momentum variables then a particle or point is describe by 6N-dimensional space (3 position + 3 momentum), which is defined the phase space.

i.e. 6N-dimensional space called the phase space.