Department of Physics

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Subject No. PH41023(Statistical Physics-I) Sunday 5th March, 2023
Assignment Due date : 29th August 2019 Total Marks: 10

Assignment # 6

§1. Consider a system may be either unoccupied or occupied by one particle with energy 0 and E. Find out 1) partition function of the system 2) Thermal average energy of the system 3) Thermal average Occupancy of the system.

§2. The relation between grand canonical and canonical partition function is

§3. Consider a system of particles in three dimensions with momentum $\vec{p}$ and energy $E = c|\vec{p}|$, c is being a constant. The system is maintained at inverse temperature β, volume V and chemical potential μ . What is the grand partition function of the system.

§4. The entropy of a gas containing N particles enclosed in a volume $\mathbf{V}$ is given by

$$S = Nk_B ln(\frac{aVE^{3/2}}{N^{5/2}}),$$

where E is total energy , a is constant and k_B is Boltzmann constant. The chemical potential μ of the system at a temperature T is given by