B.Sc. (Hons) Physics,
Class: VI Sem, Sec.-A
Paper: Statistical Mechanics
Teacher: Dr. Arpita Vajpayee

As we have finished "Bose-Einstein Statistics", now we shall start the next unit i.e. "Fermi-Dirac Statistics". Following topics will be discussed :

1) Introduction of Fermi-Dirac Statistics
2) Fermi Dirac distribution law
3) Fermi temperature and degeneracy
4) Weakly and strongly degenerate F-D system

Please read the above mentioned topics.

I am available for discussion on the class WhatsApp group at the time of our scheduled class according to the timetable. You can post your doubts/queries on this group. Several E-books have already been shared on the class WhatsApp group.

Numerical problems:

Q-1) A gas has only two particles a and b. Show with the help of diagrams how these two particles can be arranged in three quantum series 1,2,3 using (i) Maxwell-Boltzmann, (ii) Fermi-Dirac and (iii) Bose-Einstein statistics.

Q-2) Calculate the value of Fermi energy at absolute zero temperature.

Q-3) Calculate the Fermi energy in electron volts for sodium assuming that it has one free electron per atom. Given density of sodium = $0.97 g\text{-}cm^{-3}$, atomic weight of sodium is 23 g/mol.

Q-4) There are 2.54×10^{22} free electrons per cm^3 in the sodium. Calculate its Fermi energy, Fermi velocity and Fermi temperature.
[$h=6.63 \times 10^{-34}$ Js, $m=9.11 \times 10^{-31}$ Kg, $k=1.38 \times 10^{-23}$ J/K]

Please send your solutions by e-mail.

Assignment problem:

A-1) Show that sodium behaves as a metal at ordinary room temperature. [Given that density of sodium is 9.7×10^3 Kg/m^3]