Quiz2 : Statistical Thermodynamics: SCI205/405 - Spring 2020 : 15 Apr 2020

Time: 30 mins | Roll no. 2018113003, 2018113004, 2018113007 and 2018113011 | Max. marks=25

Questions carry equal marks.

1. Consider a three-level single particle system with six microstates of energies 0, ε, ε, 2ε, 2ε, 2ε. What is the mean energy of the system if it is in equilibrium with a bath at temperature T? In the region where $\beta\varepsilon \to 0$, what will the graph of heat capacity of the system as a function of ε look like at a constant temperature?

2. **State** briefly the **difference** in **assumptions** made by Einstein and Debye in developing the theory for heat capacity of solid crystals.

3. Explain qualitatively why the pressure of an ideal Fermi gas is different from that of the classical ideal gas. Mention also if it is lower or higher.

4. How will the density of states of an ideal gas like system change if its volume is doubled?

5. Obtain the value for: $\frac{\Theta_{x,H_2}}{\Theta_{x,HD}}$, for x=r(rotational) at high temperatures, without using the Tables.