BS/2110 **5221/ NH**

Title of the Paper: **Statistical Physics and Thermodynamics**
Sem-III

Time allowed: 3 hrs Maximum Marks: 30

Note: Attempt **Five** questions in all selecting **Two** questions each from each Section-A and B and the Entire Section-C which is compulsory. Each question in Section-A and Section-B carries **5** marks and compulsory question 9 carries **10** marks

Section A

1. What are fundamental postulates of statistical mechanics?
2. Write down the various microstates and macrostates for a system of two distinguishable particles distributed in two compartments
3. What is the concept of cell in compartment? What is necessity for introducing this concept?
4. Prove that

$$n_{C_r} = \frac{n_{pr}}{r!}$$

Section B

5. Discuss the basic common approach in dealing with M-B, B-E and F-D statistics.
6. Using the expression for M-B law of distribution of molecular speeds, derive the value of V_{mp}, $\bar{V}$ and V_{rms}
7. Using B-E distribution, derive Planck's law for black body radiation.
8. Show that F-D distribution law for continuous energies is

$$n(u)\,du = \frac{g(u)du}{e^{2}\,e^{4/KT} + 1}$$

Section C

9. Attempt any 5 parts :
   i. What do you mean by photon gas?
   ii. What is meant by fermi energy for conduction electrons?
   iii. What is the principle of equal a priori probability?
   iv. What is difference between microstate and microstate?
   v. What are equal likely events?
   vi. State Taylor's theorem
   vii. Differentiate between classical and quantum mechanics