6. (*a*) State Planck's law and derive equation for the B-E condensation.

Or

(*b*) Explain in detail Ising model in Bose gas.

M.Sc.–Phy-IVS (CC-401)

2018

Time : 3 hours

Full Marks : 80

Answer from **both** the Sections as per direction

The figures in the right-hand margin indicate marks

Candidates are required to answer in their own words as far as practicable

(STATISTICAL MECHANICS)

SECTION – A

1. Answer any *four* of the following : 4 × 4

(*a*) State and explain Equipartition theorem.

(*b*) Explain density fluctuations in grand canonical ensemble.

(*c*) Explain postulates of quantum statistical mechanics.

(*d*) Explain Maxwell-Boltzman distribution.

(*e*) Write a note on white dwary stars.

(*f*) Explain 1st and 2nd order phase transitions.

Or

2. Answer *all* questions from the following : 2 × 8

(*a*) Define classical ideal gas.

(*b*) Define ensemble.

(*c*) What is density matrix ?

(*d*) State third law of thermodynamics.

(*e*) What is white dwary star ?

(*f*) What is phase transition ?

(*g*) Define ideal base gas.

(*h*) Define partition function.

SECTION – B

Answer **all** questions : 16 × 4

3. (*a*) Define the three types of ensembles and

explain them. Compare and contrast the properties of ensembles.

Or

(*b*) What is Gibb's paradox ? Explain how it was resolved. Discuss the equivalence of canonical and grand canonical ensemble.

4. (*a*) State and explain Liouville's theorem in quantum statistical mechanics and discuss the ideal gas in grand cononical ensemble.

Or

(*b*) Derive expression for B-E and F-D distributions.

5. (*a*) Obtain the equation of state of ideal Fermi gas.

Or

(*b*) Write a detailed note on Pauli paramagnetism.