6. (*a*) Explain ideal Bose gas and derive equation for the Bose-Einstein condensation.

Or

(*b*) Define 1st and 2nd order phase transition and discuss Ising model.

M.Sc.-IVS– Phy (CC-401)

2017

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

4 × 4

1. Answer any *four* of the following :

(*a*) Explain postulates of classical statistical mechanics.

(*b*) Explain energy fluctuation in canonical ensemble .

(*c*) Explain third law of Thermodynamics

(*d*) Explain Fermi-Dirac distributions

(*e*) Explain Pauli paramagnetism.

(*f*) Explain Planck's law.

Or

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

(*a*) Define ensemble.

(*b*) What is do you mean by classical ideal gas ?

(*c*) Define Gibb's paradox.

(*d*) Define Density matrix.

(*e*) Define paramagnetism.

(*f*) What is Planck's law ?

(*g*) What is classical limit ?

(*h*) Define partition function.

SECTION– B

Answer **all** questions : 16 × 4

3. (*a*) State and Liourville's theorem and show that two weakly interacting systems are additive.

Or

(*b*) Explain equipartition theorem and calculate the parition function for a classical ideal monoatomic gas.

4. (*a*) Explain postulates of quantum statistical mechanics and discuss the ensembles in quantum statistical mechanics.

Or

(*b*) Explain ideal gas in grand canonical ensemble and obtain M-B distribution law.

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

Or

(*b*) Explain in detail the theory of white dwafy stars.