

M.Sc. F.Y. (Physics) (NEP Pattern) Semester-II
02MSCPH3 - DSC-III Paper-III - Classical and Statistical Mechanics

P. Pages : 2

Time : Three Hours



GUG/W/24/15417

Max. Marks : 80

Either:

1. a) Explain Calculus of Variation and Euler-Lagrange Equation. 8
- b) Explain D'Alembert's principle. 8

OR

- e) What are constraints & classify the constraints with some examples. 8
- f) Obtain Lagrange's equation of motion from Hamilton's variational principle. 8

Either:

2. a) Explain Canonical transformation, Conditions and Problems for Canonical transformation. 8
- b) Explain Hamilton - Jacobi theory. 8

OR

- e) Define 'Hamiltonian Principle' obtain Hamilton's canonical equation of motion. 8
- f) Explain Poisson bracket and discuss their properties. 8

Either:

3. a) What is Gibb's paradox? How it is resolved? 8
- b) Explain the term 'Ensembles'. Discuss micro-canonical, canonical and grand-canonical ensembles. 8

OR

- e) Explain the concept of microstate and macrostate. Calculate the number of microstate, macrostate and thermodynamic probability for distribution of three distinguishable particles in two compartments of equal size. 8
- f) State the postulates of classical and quantum statistical mechanics. 8

Either:

4. a) Compare the basic postulates of B.E. and F.D. statistics. Hence, comment about the probabilities of particles coming together according to B.E. & F.D. statistics. 8
- b) What is B-E statistics? Derive an expression $\eta_i = \frac{g_i}{e^{\alpha + \beta E_i} - 1}$ for the most probable distribution of the particle of a system obeying B-E statistics. 8

OR

- e) Define Fermi function and Fermi energy. Obtain an expression for fermi energy at absolute zero temperature. 8
- f) Explain Bose-Einstein condensation. 8
5. Answer all the followings.
- a) Explain Generalised coordinate and generalised Momenta. 4
- b) Explain Euler Angles and Euler equation of motion. 4
- c) Explain Sacker-Tetrode equation. 4
- d) Explain Maxwell-Boltzmann distribution law. 4
