

Roll No. :

Total No. of Questions : 11]

[Total No. of Printed Pages : 3

BPG–1109

M.Sc. (Previous) Examination, 2021

PHYSICS

Paper – II

(Statistical Mechanics, Electrodynamics and Plasma Physics)

Time : 1½ Hours]

[Maximum Marks : 75

Section–A

(Marks : 2 × 10 = 20)

Note :– Answer all *ten* questions (Answer limit **50** words). Each question carries **2** marks.

Section–B

(Marks : 5 × 5 = 25)

Note :– Answer all *five* questions. Each question has internal choice (Answer limit **200** words). Each question carries **5** marks.

Section–C

(Marks : 10 × 3 = 30)

Note :– Answer any *three* questions out of five (Answer limit **500** words). Each question carries **10** marks.

Section–A

2 each

1. (i) Define Phase Space.

(ii) Define Accessible states of a thermodynamical system.

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- (iii) Discuss the characteristics of indistinguishable particles.
- (iv) Define Bose-Einstein condensate.
- (v) Write the characteristics of a classical gas.
- (vi) Write wave equation for vector potential.
- (vii) Define Bremsstrahlung.
- (viii) Define Radiation Pressure.
- (ix) What do you mean by Plasma Confinement ?
- (x) Write the characteristics of Ionospheric Plasma.

Section-B

5 each

2. Considering a canonical ensemble, discuss the relation between statistics and thermodynamics.

Or

Explain Liouville's theorem in statistical mechanics.

3. Discuss the statistical properties of a Fermi-Dirac gas.

Or

Define what are fluctuations. Obtain energy fluctuation in a canonical ensemble.

4. Write a note on Landau theory of first order phase transitions.

Or

Discuss the importance of electromagnetic field tensor.

5. What is the difference between a uniformly moving and an accelerated charge ? Explain.

Or

What are Adiabatic Invariants ? Explain.

6. What are Plasma Oscillations ? Explain.

Or

Discuss Faraday rotation in a Magnetoplasma.

Section–C

7. (a) Discuss Gibb's paradox.
(b) Write the difference between canonical and grand canonical ensemble. 4,6
8. (a) Where do we apply Maxwell-Boltzmann statistics ? Explain.
(b) Write a note on Langevin theory. 4,6
9. (a) Write a note on Ising model.
(b) Discuss the importance of vector and scalar potentials. 4,6
10. (a) What are Lienard-Wiechart Potentials ? Explain.
(b) Write a note on Cherenkov Radiation. 5,5
11. (a) Discuss Debye Shielding in Plasma.
(b) Write a note on Whistler modes in a magnetoplasma. 5,5