

SECOND SEMESTER EXAMINATION 2021-22**M.Sc. PHYSICS****Paper - I****Electrodynamics & Plasma Physics**

Time : 3.00 Hrs.

Max. Marks : 80

Total No. of Printed Page : 03

Mini. Marks : 29

Note:- Question paper is divided into three sections. Attempt question of all three section as per direction Distribution of marks is given in each section.

Section 'A'**Very short answer question (in few words)**

Q.1 Attempt any six questions from the following :

6x2=12

- (i) Write down Maxwell's equations of electrodynamics.
- (ii) Write down the expressions for electric and magnetic field generated by a moving charge.
- (iii) What is Cherenkov radiation ?
- (iv) What do you mean by adiabatic Invariants ?
- (v) What is Debye Shielding ?
- (vi) What do you understand by Plasma confinement ?
- (vii) What are Alfvén wave?
- (viii) What do you understand by polarization of electromagnetic waves ?

(2)

- (ix) What is CMA diagram ?
- (x) What is Helicon ?

Section 'B'

Short answer type question (in 200 words)

- Q.1 Attempt any four questions from the following : 4x5=20
- (i) What is Lienard–Wiechert potentials ? Discuss.
 - (ii) What do you understand by time varying fields. Write down the expressions of such fields.
 - (iii) What is Synchrotron radiation ?
 - (iv) What do you mean by plasma oscillators ?
 - (v) Write down the fundamental equations of plasma and discuss it.
 - (vi) What do you mean by group velocity and phase velocity of waves ? Write the condition under which both the velocities are same.
 - (vii) What is Faraday rotation ?

Section 'C'

Long answer/Essay type question.

- Q.3 Attempt any four questions from the following questions : 4x12=48
- (i) What do you understand by scalar and vector potentials ? Write down the wave equations in terms of scalar and vector potentials and solve them.
 - (ii) What do you understand by Bremsstrahlung? Explain.
 - (iii) Derive the Boltzman equation for plasma and discuss its consequences.

(3)

- (iv) What is magneto plasma ? Explain the wave phenomena in it.
- (v) Discuss the propagation of a wave parellel and perpendicular to a magnetic field.
- (vi) Derive the Appleton–Hartree formula for propagation of wave through ionosphere and mangetosphere.

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