



QP CODE: 25803023



Reg No :

Name :

INTEGRATED MSC DEGREE EXAMINATION, JUNE 2025

Eight Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

CORE - IPH8CR03 - ELECTRODYNAMICS - II AND PLASMA PHYSICS

2021 Admission Onwards

8737F3A8

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. What is motional emf?
2. What is the continuity equation?
3. State Maxwell's equations in linear homogeneous media.
4. Give the reflection coefficient for a plane electromagnetic wave normally incident on a perfect conductor. Explain the physical significance.
5. Write down the Cauchy's formula and define coefficient of refraction and coefficient of dispersion.
6. What is the scalar potential in electrodynamics?
7. What do you mean by retarded time? Write down the expression for finding retarded time.
8. What is the role of retarded time in radiation calculations?
9. Comment on the statement 'Moving clocks run slow'.
10. Show that the velocity of a particle having zero rest mass is equal to the velocity of light.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

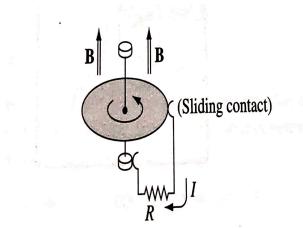
Weight 2 each.

11. Discuss Maxwell's equations in matter
12. Derive the boundary conditions for the tangential components of E while crossing a boundary separating two media.
13. State the three laws and describe how light behaves when it hits a surface, including the law of reflection and Snell's law of refraction.





14. A metal disc of radius a rotates with angular velocity ω about a vertical axis through a uniform field B , pointing up. A circuit is made by connecting one end of a resistor to the axle and the other end to a sliding contact which touches the outer edge of the disc. Find the current in the resistor.



15. What is the Coulomb gauge? How does it differ from the Lorenz gauge in the formulation of potentials?
16. What are Liénard–Wiechert potentials? Derive the expressions for the scalar and vector potentials of a point charge in arbitrary motion.
17. Derive the expression for the vector potential A of a time-dependent electric dipole in the radiation zone.
18. Suppose that in one inertial system $B = 0$ but $E \neq 0$ at some point P . Is it possible to find another system in which the electric field is zero at P ? Explain.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. Discuss the concept of electromagnetic momentum and explain how Maxwell's stress tensor is used in the conservation of linear momentum in electrodynamics.
20. Derive the modified wave equations for electromagnetic waves in conductors and discuss the concept of skin depth.
21. Derive the Larmor formula for the power radiated by a non-relativistic accelerating point charge. Explain the physical meaning of each term.
22. Get Maxwell's equations in tensor notation.

(2×5=10 weightage)

