

QP CODE: 26801769



Reg No : .....

Name : .....

**INTEGRATED M.Sc. DEGREE EXAMINATION, APRIL 2026**

**Eight Semester**

INTEGRATED M.Sc. BASIC SCIENCES-PHYSICS

**CORE - IPH8CR03 - ELECTRODYNAMICS - II AND PLASMA PHYSICS**

2021 Admission Onwards

6D703691

Time: 3 Hours

Weightage: 30

**Part A (Short Answer Questions)**

*Answer any **eight** questions.*

*Weight 1 each.*

1. What is electric flux?
2. Write the expression for the conservation of charge using concept of divergence.
3. Define skin depth and give its expression.
4. Discuss the behavior of electromagnetic wave polarization upon oblique incidence on a perfect electric conductor for both TE and TM modes.
5. Define anomalous dispersion.
6. Write down the expression for electric and magnetic field in terms of scalar and vector potential.
7. Describe retarded potentials.
8. What do you mean by radiation?
9. Suppose the speed of light were infinite, what would happen to the relativistic predictions of length contraction, time dilation and mass variation?
10. Get the expression for the Minkowski force on a charge in terms of the field tensor.

(8×1=8 weightage)

**Part B (Short Essay/Problems)**

*Answer any **six** questions.*

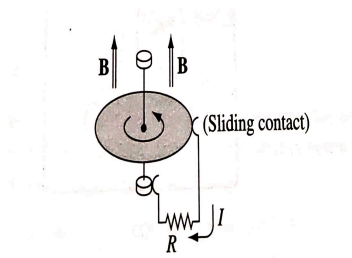
*Weight 2 each.*

11. Derive Gauss's law inside matter starting from first Maxwell's equation.





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  $\omega$  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. Derive the expression for the electric field of a point charge moving with constant velocity.
17. Write a short note on radiation reaction. Also write Abraham-Lorentz formula.
18. Discuss proper time and proper velocity. Also arrive at the expression for 4-velocity.

(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. Using Maxwell's equations, derive the wave equation for electromagnetic wave propagation in a linear, homogeneous medium.
21. Derive the Larmor formula for the power radiated by a non-relativistic accelerating point charge. Explain the physical meaning of each term.
22. Discuss how electromagnetic fields are transformed.

(2×5=10 weightage)

