

D 131488

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2025**

Physics/Applied Physics

PHY 3B 03/APH 3B 03—ELECTRODYNAMICS—I

(2020—2023 Admissions)

Time : Two Hours

Maximum : 60 Marks

*The symbols used in this question paper have their usual meanings.***Section A (Short Answer Type)***Answer **all** questions in two **or** three sentences**Each correct answer carries a maximum of 2 marks*

1. What is BAC-CAB rule ?
2. What is the force on a test charge Q due to a single point charge q . Write down the expression ?
3. Define magnetic susceptibility.
4. What do you mean by curl less field ?
5. Define atomic polarizability.
6. Write the integral form of Ampere's law.
7. State and explain Biot -Savart law.
8. Write the unit vectors in spherical coordinate system in terms of Cartesian system.
9. Distinguish paramagnets and diamagnets.
10. What is the physical interpretation of bound charges.
11. Define magnetic vector potential.
12. Discuss the fundamental theorem for gradients.

(Ceiling - 20)

Turn over

Section B (Paragraph/Problem Type)

Answer all questions in a paragraph of about half a page to one page.

Each correct answer carries a maximum of 5 marks.

13. Find the gradient of $r = \sqrt{x^2 + y^2 + z^2}$.
14. Discuss the fundamental theorem for gradient, divergence and curl.
15. A solid hemisphere has radius R and uniform charge density ρ . Find the electric field at the center.
16. Find the electric field a distance z above the midpoint between two equal charges (q), a distance d apart.
17. Show that the potential of a polarized object is the same as that produced by a volume charge density plus a surface charge density.
18. Discuss briefly about the bound currents in a magnetized medium.
19. A long straight wire, carrying uniform line charge λ , is surrounded by rubber insulation out to a radius a . Find the electric displacement.

(Ceiling - 30)

Section C (Essay Type)

Essays - Answer in about two pages, any one question.

Answer carries 10 marks.

20. State and prove Gauss's law. Using Gauss's theorem, Find the field outside a uniformly charged solid sphere of radius R and total charge q .
21. Explain the linear current density, surface current density and volume current density. Derive the continuity equation.

(1 × 10 = 10 marks)