24U303S (Pages: 2) Name: .....

Reg.No: .....

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - UG)

CC19UPHY3B03 / CC20UPHY3B03 - ELECTRODYNAMICS - I

(Physics - Core Course)

(2019 to 2023 Admissions - Supplementary/Improvement)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. What is meant by displacement vector and separation vector?
2. What is the physical interpretation of divergence of a vector field?
3. Write down the expression for the elemental volume and elemental area of the curved surface of a cylinder in in cylindrical coordinate system.
4. Define electric field. How is it measured? Give an expression for the field due to a point charge.
5. What is electric potential?
6. What do you mean by the polarization vector P. what is its value for free space?
7. What is electric susceptibility?
8. What is the physical significance of del.B = 0?
9. Write down magnetostatic boundary conditions.
10. What are bound currents?
11. The Ampere's law uniquely determines B, if we know all the current densities. But it does not always give H uniquely. Why?
12. Explain magnetic suspetibility of a material.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. State and explain the fundamental theorems of Divergence and curl.
14. Find electric field inside and outside a parallel plate capacitor using Gauss flux theorem.
15. What is a cylindrical capacitor? Find an expression for its capacitance.
16. Find an expression for the force acting on a dipole in a non-uniform electric field.

17. Find the polarization P in a dielectric material with relative permittivity 2.8, if electric flux density $D = 0.003nC/m^2$ Assume that the material is homogenous and isotropic.

18. A particle of charge 10-20 C is moving with a velocity 8x106 i m/s. It enters a region of electric field 106 j V/m and magnetic field 0.2i T. Find the force that will act on it.

19. Distinguish between para, dia and ferromagnetic materials.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. With the help of suitable diagrams, derive the boundary conditions for electric field vector E. Also obtain the boundary conditions for electric potential.

21. Discuss the motion of electric charges in transverse electric and magnetic fields '.

(1 × 10 = 10 Marks)

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