Reg. No. : ....

Name : ....

**V Semester B.Sc. Degree (CBCSS – Supplementary)
Examination, November 2024
(2018 Admission)
CORE COURSE IN PHYSICS
5B06PHY : Electrodynamics – I**

Time : 3 Hours

Max. Marks : 40

Instruction : Write **all** answers in **English** only.

SECTION – A

Very short answer type – Answer **all** questions – **each** carries **1** mark.

1. State the principle of superposition in electrostatics.

2. What is a dipole's electric potential at a large distance from it ?

3. Define magnetic flux.

4. Write the expression for the energy stored in a magnetic field.   **(4×1=4)**

SECTION – B

Short answer type – Answer **any 7** – **each** carries **2** marks.

5. Explain the concept of the displacement vector D.

6. State and explain the physical significance of Gauss's law.

7. What is the electric potential of a point charge ?

8. What is a multipole expansion ? Explain its importance in electrostatics.

9. Explain the concept of linear dielectrics.

10. What is the equation of continuity for steady currents ?

P.T.O.

11. Write the boundary conditions for the magnetic field at the interface of two media.

12. Differentiate between susceptibility and permeability.

13. Write down the expression for the energy density in a magnetic field.

14. Compare electric field E and magnetic field B based on 4 properties.   **(7×2=14)**

SECTION – C

Short essay/problem type – Answer **any 4** questions – **each** carries **3** marks.

15. Find the electric field due to a uniformly charged sphere of radius R on its surface using Gauss's law.

16. Derive the expression for the force per unit area on the surface of a charged conductor.

17. Derive the expression for the magnetic field inside a toroidal solenoid.

18. In a cyclotron the oscillator frequency is 10 MHz. What is the operating magnetic field for accelerating protons ? [e = 1.6×10^{-19} C, proton mass = 1.67×10^{-27} kg]

19. Explain the Clausius – Mossotti equation and its importance in dielectrics.

20. Derive an expression for the capacitance of a parallel plate capacitor.   **(4×3=12)**

SECTION – D

Long essay type – Answer **any 2** questions – **each** carries **5** marks.

21. Derive Poisson's and Laplace's equations and explain their physical significance in electrostatics.

22. Define polarization. Obtain the electric field produced by a polarized object.

23. State Biot Savart law. Find the magnetic field at a distance s vertically above from a long straight wire carrying current I.

24. Derive the expression for the magnetic field inside a toroidal solenoid using Ampere's circuital law.   **(2×5=10)**

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