



K25U 2359

Reg. No. :

Name :

V Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/
Improvement) Examination, November 2025
(2019 to 2023 Admissions)
CORE COURSE IN PHYSICS
5B07PHY : Electrostatics and Magnetostatics

Time : 3 Hours

Max. Marks : 40

PART – A

(Short answer questions. Answer **all** questions. **Each** carries 1 mark)

1. What do you mean by electric susceptibility ?
2. What is an equipotential surface ?
3. State Gauss's law.
4. What are the factors on which the capacitance of a parallel plate capacitor depends ?
5. What is volume current density ?
6. Explain the term Curie point.

(1×6=6)

PART – B

(Short essay questions. Answer **any six** questions. **Each** carries 2 marks)

7. Write the expression for electrostatic potential for continuous volume charge distribution. Explain the terms involved.
8. Discuss the principle behind Faraday's cage being used for sensitive apparatus .
9. How much work is to be done to charge a capacitor to final amount Q ?
10. What happens when a polar molecule is placed in a uniform electric field ?
11. What is the dielectric constant of a material ? Give its expression.
12. What is the magnetic dipole moment of a current loop and how does it behave in an external magnetic field ?

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13. Briefly explain the term bound currents.
14. Find the maximum kinetic energy of a particles accelerated in a cyclotron of radius R and magnetic field B.

(2×6=12)

PART – C

(Problems. Answer **any four** questions. **Each** carries 3 marks)

15. Check whether this expression stands for an electrostatic field
$$E = k[xy\hat{x} + 2yz\hat{y} + 3xz\hat{z}]$$
16. Find the energy of a uniformly charged spherical shell of total charge q and radius R.
17. Find the capacitance/unit length of two coaxial metallic cylindrical tubes of radii a and b.
18. Find the magnetic field of an infinite uniform surface current $K = k\hat{x}$ flowing over the xy plane.
19. Derive the integral form of Ampere's law.
20. Find the vector potential of an infinite solenoid with n turns per unit length, radius R and current I.

(3×4=12)

PART – D

(Long essay questions. Answer **any two** questions. **Each** carries 5 marks)

21. Derive the expression for energy of a point charge distribution.
22. Obtain the relation for forces acting on dielectric material.
23. State Biot Savart's law. Find the magnetic field at a distance s from a long straight wire carrying a steady current I.
24. Explain the properties of paramagnets, diamagnets and ferromagnets.

(5×2=10)