



K17U 1706

Reg. No. :

Name :

V Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.) Examination,
November 2017
(2014 Admn. Onwards)
Core Course in Physics
5B06PHY : ELECTRODYNAMICS – I

Time : 3 Hours

Max. Marks : 40

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

SECTION – A

Very short answer type. **All** questions to be answered. **Each** question carries **1** mark.

1. The –ve gradient of potential is known as
2. What is the SI unit of Permittivity in free space ?
3. For uniform polarisation, volume bound charge density inside a dielectric is
4. 'B is solenoid' what is its significance ? (4×1=4)

SECTION – B

Short answer type, **seven** questions to be answered. **Each** question carries **2** marks.

5. Derive Poisson's equation.
6. Define electrostatic scalar potential.
7. What will be the electric field at a point 5 cm away from the centre of an α particle in free space ?
8. What are the properties of linear dielectric ?
9. Derive the equation, which connects three important vectors of electrostatics.
10. Prove that the normal components of magnetic field is continuous through the boundary.

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11. What is the relation between dielectric constant and refractive index of a material.
12. Define magnetic flux density at a point.
13. Write a note on magnetic vector potential.
14. State Gauss' law in presence of dielectric. (7×2=14)

SECTION – C

Short essay/problem type, **four** questions to be answered. **Each** question carries **3** marks.

15. A point charge 10^{-7} C is situated at the centre of a cube of side 1 m. Calculate the electric flux through its single surface.
16. Derive the expression for the energy of a group of point charges.
17. What will be the electric field intensity at a distance of 5 cm away from an infinite thin layer of charge have a surface charge density 250 nC/m^2 ?
18. Compare the electrostatic and gravitational force of interaction between the electron and proton in hydrogen atom. Mass of proton = 1.67×10^{-27} kg, mass of electron = 9.1×10^{-31} kg, gravitational constant = $6.67 \times 10^{-11} \text{ m}^2/\text{kg}^2$. Distance between electron and proton = 0.53 \AA .
19. Using Ampere circuital law, obtain an expression for magnetic field within a toroid.
20. Why are we relatively safe inside a metal car during lightning ? (4×3=12)

SECTION – D

Long essay type, **two** questions to be answered. **Each** question carries **5** marks.

21. Explain electrostatic boundary conditions.
22. Explain :
 - 1) Bound charge densities.
 - 2) Current densities.
23.
 - 1) Write a note on dielectric.
 - 2) Obtain an expression for force on dielectric.
24. State Ampere's circuital law. Express the law in integral form and hence obtain an expression for curl of B. (2×5=10)