



K16U 1724

Reg. No. :

Name :

V Semester B.Sc. Degree (CBCSS – 2014 Admn. – Regular)
Examination, November 2016
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. Write differential form of Gauss law.
2. Normal derivative of potential v is _____ through the boundary.
3. Define electric dipole moment.
4. What is the value of permeability in free space, in SI units ? **(4×1=4)**

SECTION – B

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

5. Derive Poisson's equation.
6. Write a brief note on electric scalar potential.
7. Show that tangential components of electric fields are always continuous through the boundary.
8. Volume charge density is zero inside a conductor. Why ?
9. What is linear dielectric ?
10. Show that curl of electric displacement vector is non zero.
11. Describe surface current density.

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12. Show that magnetic forces do not work.
13. State and explain Ampere's law in magnetostatics.
14. What is magnetisation ?

(7×2=14)

SECTION – C

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

15. Derive three dimensional Dirac delta function.
16. Find capacitance of two concentric spherical metal shells of radii 3 cm and 5 cm.
17. Derive expressions for volume bound charge density and surface bound charge density.
18. Derive an expression for energy in dielectrics.
19. Two charges $1\ \mu\text{C}$ and $4\ \mu\text{C}$ are placed in air at a distance 12 cm apart. Find the position of the third charge to be placed in between two charges, so that the electric field intensity is zero at the point.
20. Two straight wires each 1 m long are parallel to one another and each carries a current of 3 A. What will be the force set up between the wires, if the distance between the wires is 0.002 m ?

(4×3=12)

SECTION – D

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

21. a) Explain Gauss law.
b) Derive differential and integral form of Gauss law.
c) Why symmetry is crucial to the application of Gauss law ?
22. Discuss the energy of point charge and continuous charge distribution.
23. a) Write a note on dielectrics.
b) Explain forces on dielectric.
24. a) Explain magnetic vector potential.
b) Derive magnetostatic boundary conditions and what are the importance of boundary conditions in electrodynamics ?

(2×5=10)