



K20U 1544

Reg. No. :

Name :

V Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.)
Examination, November 2020
(2014 Admn. Onwards)
Core Course in Physics
5B06 PHY : ELECTRODYNAMICS – I

Time : 3 Hours

Max. Marks : 40

SECTION – A

Answer **all** questions (Very short type, **Each** question carries **1** mark).

1. Differential form of Gauss's law is
2. Susceptibility is independent of
3. The unit of magnetic flux is
4. Charge flowing per unit area is called

(4×1=4)

SECTION – B

Answer **any seven** questions (Short answer type, **Each** question carries **2** marks).

5. Define electric flux.
6. What is meant by electric field at a point ? Give its unit.
7. Obtain Poisson's equation from Gauss's law.
8. Explain the terms induced dipole moment and atomic polarisability.
9. Define dielectric constant and dielectric strength of a material.
10. What is meant by magnetic vector potential ?

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K20U 1544

- 11. Write down the Clausius Mossoti equation and explain the symbols.
- 12. Explain the cyclotron motion.
- 13. State the principle of superposition for magnetic fields.
- 14. Distinguish between electrostatics and magnetostatics.

(7×2=14)

SECTION – C

Answer **any four** questions (Short essay/problem type, **Each** question carries **3** marks).

- 15. Find the potential at a distance r from an infinitely long straight wire that carries a uniform line charge λ .
- 16. Find the energy of a uniformly charged spherical shell of total charge q and radius R .
- 17. Suppose an electric field $\vec{E}(x, y, z)$ has the form $E_x = ax$, $E_y = 0$ and $E_z = 0$. Where a is a constant. What is the charge density?
- 18. A dielectric sphere of radius a has a polarization $\vec{p} = k \vec{r}$, where k is a constant and origin is at the centre of the sphere. Find the electric displacement.
- 19. A particle of mass 'm' carrying charge 'q' enters a magnetic field B with a velocity v . Show that the kinetic energy of the charge remains constant.
- 20. Show that surface current density $\vec{K} = \sigma \cdot v$.

(4×3=12)

SECTION – D

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

- 21. Derive an expression for the energy of a continuous charge distribution.
- 22. Derive Gauss law for the field of polarization vector P .
- 23. State and prove Biot Savart law.
- 24. Derive an expression for the trajectory of the charged particle moving in a transverse electric and magnetic field.

(2×5=10)

