



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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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)