Reg. No. : ....

Name : ....

V Semester B.Sc. Degree (CBCSS – Supplementary)
Examination, November 2023
(2017 & 2018 Admissions)
CORE COURSE IN PHYSICS
5B06PHY – Electrodynamics – I

Time : 3 Hours

Max. Marks : 40

Instructions : 1) Section – **A** : Answer **all** questions (Very short answer type, **each** question carries **1** mark)

2) Section – **B** : Answer **any seven** questions (Short answer type, **each** question carries **2** marks)

3) Section – **C** : Answer **any four** questions (Short essay/ problem type, **each** question carries **3** marks)

4) Section – **D** : Answer **any two** questions (Long essay type, **each** question carries **five** marks)

5) Write answers in **English** only.

SECTION – A

1. Write down the equation for the force between two point charges q_1 and q_2 placed in air or free space at a distance r apart.

2. Show that for electrostatic, curl E = 0.

3. Write down the ampere circuital law in differential form

4. The force experienced by an electromagnetic wave in a conductor is   **(4×1=4)**

SECTION – B

5. What is the electric field due to a point charge.

6. Obtain Poisson's and Laplace equations.

7. Define the term susceptibility permittivity and dielectric constant.

8. Show that curl of a vector quantity is a vector.

P.T.O.

9. Show that $\nabla \cdot B = 0$.

10. Briefly explain cycloid motion.

11. Briefly compare magnetostatics with electrostatics.

12. What are scalar and vector fields ?

13. What is Gauss law in dielectrics ?

14. Explain boundary conditions in magnetostatics.

(7×2=14)

SECTION – C

15. If $F = xy\hat{i} - 4yz^2\hat{j} + y^3z\hat{k}$, Find $\nabla \cdot F$ at (2, 1, 0).

16. Compute the magnetic field of a long straight wire that has a circular loop with a radius of 0.05m. The current flowing through the closed loop is 2A.

17. Using Ampere's law, calculate the magnetic field inside a long straight solenoid of length l, carrying a current I.

18. Two identical conducting plates charged with equal and opposite charges be place very close to each other. Derive the expression for energy density of such parallel plate capacitor.

19. Explain divergence and curl of a vector field.

20. A long solenoid has 200 turns per cm and carries a current of 2.5A. What is the magnetic field at its centre ?

(4×3=12)

SECTION – D

21. Derive the expression for field due to spherically symmetric charge distribution.

22. Using Gauss law, find the electric field due to infinitely long straight uniformly charged wire having linear charge density λ.

23. Explain the fundamental laws in electrodynamics.

24. Compare with the scalar potential V in electrostatics, explain magnetic vector potential A and show that $\nabla^2 A = \mu_0 J$.

(2×5=10)

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