Reg. No. : ....

Name : ....

B.Sc. V Semester Degree (CBCSS- Reg./Sup./Imp.) Examination,

November-2019

(2014 Admn. Onwards)

Core Course in Physics

5B06 PHY: ELECTRODYNAMICS-I

Max. Marks : 40

Time : 3 hrs

Instructions: Write answers in English only.

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 5 marks).

SECTION - A

(4×1=4)

1. The electric field inside a spherical shell of uniform surface charge density is --------------------

2. A charge q is placed at the centre of a cube with side L the electric flux linked with a cubical surface is -------------

3. Write the unit of atomic polarisability

4. A charged particle is released from rest in a region of steady and uniform electric and magnetic fields which are parallel to each other. The particle will move in a ----------- 3.

P.T.O.

SECTION - B

(7×2=14)

5. State Gauss's law. Write its integral form.

6. State the boundary conditions of E and D

7. What is meant by induced dipole moment and atomic polarisability?

8. Write down the Clausius - Mosotti relation and explain the symbols.

9. Give any two electrostatic properties of conductors.

10. State Ampere's circuital theorem.

11. What is Lorentz force? Write down the relation.

12. Field lines never cross each other. Why?

13. What is a capacitor? Write its principle.

14. Define the terms surface current density and volume current density.

SECTION - C

(4×3=12)

15. A solenoid of length 2m has 1000 turns. If a current of 1A flows through it, find the strength of the field at the centre and also at the ends.

16. Compare electrostatics and magnetostatics.

17. Show that the force between two charges separated by a distance is reduced by a factor $\dfrac{1}{1+\dfrac{P}{E\epsilon 0}}$ due to the presence of dielectric.

18. Derive an expression for energy and energy density stored in a charged capacitor.

19. A wire of length 3.14m is bent into a semicircle. If the wire carries a current of 2A. What is the field at the centre of the semicircle?

20. Derive an expression for the force between two straight parallel current carrying conductors.

SECTION - D

(2×5=10)

21. Derive an expression for the magnetic field inside

    1) A solenoid and

    2) A toroid

22. Define potential. Find the potential due to a uniformly charged conducting sphere.

23. Derive the relation between polarisability and susceptibility and arrive at Clausius Mosotti relation.

24. Derive an expression for the magnetic field due to a straight conductor carrying steady current using Biot- Savart's law.

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