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Reg. No.............................

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION
APRIL/MAY 2015

(UG-CCSS)

Core Course—Physics

PH 4B 07—ELECTRODYNAMICS—I

Time : Three Hours   Maximum : 30 Weightage

Section A

*Answer **all** questions.*
Each question carries a weightage of ¼.

1. In a charged bubble the mechanical force due to charge is counter balanced by :

    (a) Force of gravity.   (b) Viscosity.

    (c) Surface tension.   (d) None of the above.

2. The electric field inside a perfectly conducting media is :

    (a) α.   (b) °.

    (c) 120π.   (d) None of the above

3. The dimension of potentials are same as that of :

    (a) Work.   (b) Electric field per unit charge.

    (c) Work per unit charge.   (d) Force per unit charge.

4. In free space Poisson's equation is :

    (a) $\nabla^2 V = 8.85 \times 10^{-12} e$ (b) $\nabla^2 V = 0$.

    (c) $\nabla^2 V = \alpha$.   (d) None of these.

5. The unit of $\overline{D}$ is :

    (a) V/m^2.   (b) Coul/m^2.

    (c) V/m.   (d) Q/m.

6. The unit of polarisation is $\bar{p}$ is :

    (a) Same as that of $\overline{E}$.   (b) Same as that of $\overline{D}$.

    (c) Same as that of charge.   (d) None of the above.

Turn over

7. For steady state continuity equation is :

    (a) $\nabla \cdot J = 0$.   (b) $\nabla \cdot J = -\dfrac{\partial e}{\partial t}$.

    (c) $\nabla \cdot J = 0$.   (d) $\nabla \cdot J = \dfrac{\partial e}{\partial t}$.

8. $\nabla \cdot B = 0$ is based on :

    (a) Continuity equation.   (b) Faradays law.

    (c) Gauss's law.   (d) Ohm's law.

9. If two conductors carry current in opposite direction, they will experience a force of :

    (a) Attraction.   (b) Repulsion.

    (c) No force.   (d) None of the above.

10. The ratio of intensity of magneticfield at the centre of a very long solenoid to that at the ext
    end is :

    (a) 2.   (b) ½.

    (c) 4.   (d) ¼.

11. The idea of displacement current is due to :

    (a) Ampere.   (b) Faraday.

    (c) Gauss.   (d) Maxwell.

12. The source of H is :

    (a) Q.   (b) M.

    (c) I.   (d) B.

                                                        $(12 \times ¼ = 3 \text{ weig}$

Section B

*Answer **all** questions.*
Each question carries 1 weightage.

13. Define electron volt.

14. What are the importance of Poisson's equation ?

15. What are polar and non-polar molecules ?

16. Write down the relation between electric susceptibility and atomic polarisability. **45**

17. What do you mean by dielectric strength ?

18. State and explain Ampere's circuital law.

19. Discuss the importance of the equation $\nabla \cdot B = 0$.

20. Obtain an expression for energy density in a magnetic field.

21. Write short note on Poynting Vector.

$(9 \times 1 = 9$ weightage)

Section C

Answer any **five** *questions.*
Each question carry 2 weightage.

22. Obtain the expression for Laplace equation and bring out its importance.

23. What do you mean by electrostatic boundary conditions ?

24. Discuss the applications of method of images.

25. Obtain the relation between three electric vectors.

26. Obtain the relation between suscephability and polarisability.

27. With suitable example discuss any *one* application of Amperes law to find the field.

28. Distinguish between linear and non-linear media. Write down the expression for torques and force on magnetic dipole.

$(5 \times 2 = 10$ weightage)

Section D

Answer any **two** *questions.*
Each question carries 4 weightage.

29. With necessary theory obtain electrostatic boundary conditions. Discuss about work and energy in electrostatics.

30. What do you mean by polarizability tensor ? Obtain an expression for torque acting on a dipole in a uniform electric field.

31. Derive an expression for the magnetic field due to an infinitely long straight conducted and hence find the field at the centre of a square loop of side 'a' carrying current I.

$(2 \times 4 = 8$ weightage)