C81814

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Name.....

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 $\vec{D}$ is :

   (a) V/m^2.
   (b) $Coul/m^2$.
   (c) V/m.
   (d) Q/m.

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

   (a) Same as that of $\vec{E}$.
   (b) Same as that of $\vec{D}$.
   (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) $\nabla \cdot J = -\frac{\partial e}{\partial t}$.

(c) $\nabla \cdot J = 0$.

(d) $\nabla \cdot J = \frac{\partial e}{\partial t}$.

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 extr 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 × ¼ = 3 weight

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.
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 × 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 × 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 × 4 = 8 weightage)