Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore – 641 043
Master's Degree Examination – November 2017
III Semester

Class: II M.Sc.
Major: Physics

Time: 3 hrs
Max. Marks: 60

12MPHC13-Electromagnetic theory and Electrodynamics

Part – A **10x0.5=5 Marks**

Choose the correct answer

1. The scalar function of position whose negative gradient gives the electric field is called
   a) chemical potential b) Coulomb potential
   c) electrostatic potential d) Zener potential

2. Dipole moment acquired by a molecule per unit polarising field is called
   a) polarisability b) dipole moment
   c) polarisation d) molecular moment

3. Toroid is a _____ bent round in the form of a closed ring
   a) solenoid b) circular coil c) long straight wire d) cylinder

4. The lagging of B behind H is called
   a) retentivity b) hysteresis c) coercivity d) conductivity

5. If Poynting vector is zero for a closed surface then
   a) no net electromagnetic energy can flow
   b) net electromagnetic energy can flow
   c) total field energy can flow
   d) total magnetic energy can flow

6. According to Maxwell's second equation, the total flux of magnetic induction linked with a closed surface is
   a) q b) -dB/dt c) 0 d) b.dS

7. If a linearly polarised wave is reflected from the boundary at an incident angle greater than the critical angle, the reflected wave will be _____ polarised
   a) transversely b) longitudinally c) circularly d) elliptically

8. Brewster's angle is also called as
   a) polarising angle b) incident angle
   c) critical angle d) transmitted angle

9. The particles which move with constant velocity cannot
   a) transmit energy b) radiate energy
   c) acquire energy d) transfer energy

10. In a short linear antenna most of the input power would be dissipated as
    a) light b) sound c) heat d) eddy current

Part – B 5 x 4 = 20 Marks

Answer the following

Answer should not exceed 200 words or one page

11. a) State and outline the importance of Green's theorem.

(or)

b) Explain polarisability.

12. a) State and explain Ampere's circuital law.

(or)

b) Distinguish between magnetic scalar and vector potential.

13. a) What are electromagnetic potentials?

(or)

b) Explain about gauge invariance.

14. a) State the boundary conditions of electromagnetic field vectors.

(or)

b) Explain how to achieve total internal reflection.

15. a) What is an oscillating electric dipole?

(or)

b) Explain about radiation from a linear antenna.

Part - C 5 x 7 = 35 Marks

Answer all questions

Answer should not exceed 600 words or six pages

16. a) Establish Gauss's theorem for an electrostatic field. Deduce Laplace and Poisson's equations.

(or)

b) Derive the Clausius-Mossotti relation for non-polar molecules.

17. a) Explain Biot-Savart law with its applications.

(or)

b) What is hysteresis? Derive an expression for energy dissipated in a hysteresis cycle.

18. a) With the help of electromagnetic field equations explain Poynting's theorem.

(or)

b) Derive Maxwell's equations.

19. a) Describe the laws governing reflection and refraction in electromagnetic waves.

(or)

b) Explain in detail about the propagation of electromagnetic waves in a conducting media.

20. a) Explain the radiation from an oscillating electric dipole.

(or)

b) Using scalar and vector potentials derive Lienard-Wiechert potentials.

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