NOVEMBER/DECEMBER 2018

MPH22 — ELECTROMAGNETIC THEORY AND PLASMA PHYSICS

Time : Three hours Maximum : 75 marks

SECTION A — (5 × 6 = 30 marks)

Answer ALL the questions, choosing either (a) or (b).

1. (a) State and Prove Laplace equation.

Or

(b) State and prove uniqueness theorem.

2. (a) State and explain Blot – Savart law.

Or

(b) Write the characteristics of magnetic vector potential.

3. (a) State and explain Faraday's law of electromagnetic induction.

Or

(b) Write short notes on (i) Displacement current and (ii) Gauge invarience.

4. (a) Explain briefly about the polarization of electromagnetic waves on the basis of linear and circular polarization.

Or

(b) Discuss the reflection of electromagnetic waves at the interface of two non conducting media.

5. (a) Explain briefly about electron plasma oscillations.

Or

(b) Explain briefly about the Alfven Waves and magnetosonic waves.

SECTION B — (3 × 15 = 45 marks)

Answer any THREE questions.

6. Obtain the expression for potential inside and outside of dielectric sphere placed in uniform electric field.

7. State Ampere's circuital law and obtain the expression for the same when the path does not enclose the current.

8. Solve Maxwell's equations in free space to show that :

(a) E and B are in Phase, and

(b) Energy flows with velocity of light.

9. Discuss the reflection and refraction of electromagnetic waves at the interface of two non conducting media and derive the Fresnel equations.

10. What are magneto hydrodynamic equations? Deduce the expressions for the same.
