Physics- PH-102

Paper – II: Electricity, Magnetism and Electromagnetic theory

Max. Marks: 40

Internal Assessment: 10

Time: 3 hours

<u>**Note:-**</u>

1. Nine Questions will be set in total.

2. Question number 1 will be compulsory and will be based on the conceptual

aspects of entire syllabus. This question may have five parts and the answer

should be in brief but not in Yes/ No.

3. Four more questions are to be attempted, selecting one question out of two

questions set from each unit. Each question may contain two or more parts. All questions

will carry equal marks.

4. 20% numerical problems are to be set.

5. Use of scientific (non-programmable) calculator is allowed.

Unit I: Vector background and Electric field

Gradient of a scalar and its physical significance, Line, Surface and Volume integrals of

a vector and their physical significance, Flux of a vector field, Divergence and curl of a

vector and their physical significance, Gauss's divergence theorem, Stoke's theorem.

Derivation of electric field E from potential as gradient, Derivation of Laplace and

Poisson equations, Electric flux, Gauss's Law, Mechanical force of charged surface,

Energy per unit volume.

Unit 2: Magnetism

Magnetic induction, Magnetic flux, Solenoidal nature of vector field of induction,

properties of (i) , (ii) , Electronic theory of dia and paramagnetism,

Domain theory of ferromagnetism (Langevin's theory), Cycle of magnetization- hystresis loop (Energy dissipation, Hystresis loss and importance of Hystresis Curve)

Unit 3: Electromagnetism

Maxwell equations and their derivations, Displacement current, Vector and Scalar potentials, Boundary conditions at interface between two different media, Propagation of

electromagnetic wave (Basic idea, no derivation), Poynting vector and Poynting theorem.

Unit 4: A. C. Analysis

A.C. circuit analysis using complex variable with (a) Capacitance and Resistance (CR) (b) Resistance and Inductance (LR) (c) Capacitance and Inductance (LC) and (d) Capacitance, Inductance and Resistance (LCR),

Series and parallel resonance circuit, Quality factor (sharpness of resonance).

Reference:

1. Electricity and Magnetism by Reitz and Milford (Prentice Hall of India).

2. Electricity and Magnetism by A.S. Mahajan and A.A. Rangwala (Tata McGrawHill)