

Exam. Code : 103202

Subject Code : 1304

B.A./B.Sc. Semester-II

PHYSICS (Relativity & Electromagnetism)

Paper-A

Time Allowed—3 Hours] [Maximum Marks—35

Note : There are **FIVE** questions in total. Section A is compulsory. Attempt **ONE** question each from Sections B, C, D and E.

SECTION—A

- I. (i) What are the applications of Hall's effect ?
- (ii) Define skin depth.
- (iii) A clock gives correct time. With what speed it be moved relative to an observer so that it may be seem to lose 1 minute in 24 hrs ?
- (iv) What is the direction of force between two parallel wires carrying currents in opposite directions ?
- (v) What is the phase difference between electric and magnetic field vectors of an em wave in conducting medium and why ?
- (vi) Which equation shows that isolated magnetic poles do not exist ?
- (vii) What is Minkowski space ? 1×7=7

SECTION—B

- II. Starting from Lorentz transformation equation for space coordinates derive the equations for transformation of velocities. Under what conditions do these equations reduce to Galilean transformation equations for velocities ? 7
- III. What do you understand by relativistic Doppler's effect ? Describe an expression for longitudinal Doppler's effect. 7

SECTION—C

- IV. State and explain Hall's Effect and mention its significance. 7
- V. State and explain Ampere's circuital law. Use it to find the magnetic field due to a toroid solenoid. Also derive its differential form. 7

SECTION—D

- VI. Calculate the work done in establishing a current I in circuit having self inductance. Hence prove that the coefficient of self inductance is numerically twice the work done in establishing a unit current in an inductor. 7
- VII. (a) Explain the concept of displacement current and derive an expression for the same in a region where electric field is changing with time. 4
- (b) What is Q-factor and find it for series resonant circuit ? 3

SECTION—E

VIII. State Maxwell's equations for electromagnetism in free space, discussing each critically. What information do these equations furnish with regard to electromagnetic nature of light ? 7

IX. (a) Define Poynting vector for em wave and find its average value for plane sinusoidal wave. 5

(b) What do you mean by dispersion ? Explain its types. 2

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