

25. (a) Derive expression for Lorentz force on a charged particle by Lorentz transformation of force.

Or

(b) Finding the component of wave four vector, show that its square is zero.

SECTION C — (5 × 10 = 50 marks)

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

26. (a) Deduce Clausius-Mossotti relation and derive Lorentz-Lorentz formula.

Or

(b) Derive an expression for the Magnetic Scalar potential.

27. (a) Starting from Maxwell's equation, prove (i) Coulomb's law (ii) Continuity equation.

Or

(b) Derive expressions for electric and magnetic field due to an oscillating dipole.

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28. (a) Derive Rayleigh's resistance formula for weak skin effect.

Or

(b) What are the peculiarities of metallic reflection? Give its theory in brief and describe a method for its verification.

29. (a) Derive expression for Thomson Scattering Cross-section in terms of classical electromagnetic radius.

Or

(b) Show that the scattering cross section when plane monochromatic waves are incident on

(i) Free electron is  $\sigma_T = \frac{8\pi}{3} r_0^2$ .

(ii) Bound electron  $\sigma_B = \left(\frac{\omega}{\omega_0}\right)^4 \sigma_T$ .

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