20. (a) Obtain the transformation relations for charge and current densities.

Or

(b) Derive the covariant form of electric and magnetic field equations. Arrive at the covariant form of the Lorentz force law.

SECTION D — (2 × 10 = 20 marks)

21. (a) Derive the Claussius–Mosotti relation. Show how it was modified by Debye in the case of polar molecules.

Or

(b) Discuss the radiation produced by a low velocity accelerated charged particle. Derive Larmor's power formula and discuss the three cases.

22. (a) Derive the equations for the propagation of EM waves in a rectangular waveguide. Obtain the expression for cutoff wavelength.

Or

(b) Discuss the theory of anomalous dispersion. Explain it in the case of solids.