



Date: 11-11-2024

Dept. No.

Max. : 100 Marks

Time: 01:00 pm-04:00 pm

SECTION A**Answer ANY FOUR of the following****4 x 10 = 40 marks**

1. Explain how a coaxial transmission line supports propagation of TEM waves.
2. Derive expressions for energy density and momentum of electromagnetic waves.
3. Show that TEM waves cannot occur in a hollow wave guide.
4. Explain Compton scattering. Derive an expression for Compton wavelength of an electron.
5. Describe Hall-Magneto Hydrodynamics.
6. Explain the work-energy theorem.
7. Discuss the superposition principle in electrostatics.
8. An electric dipole consists of two equal and opposite charges ($+q$ and $-q$) separated by a distance d . Find the approximate potential at points far from the dipole.

SECTION B**Answer ANY THREE of the following****3 x 20 = 60 Marks**

9. Outline the theory of multipole expansion of electrostatic potential in powers of $(1/r)$.
10. Establish Maxwell's equations in matter.
11. Obtain Leinard -Wiechert potentials for a moving point charge.
12. What are waveguides? Obtain expressions for the longitudinal components E_z and B_z .
13. Prove the uniqueness theorems in electrostatics.
14. Explain in detail the structure of Spacetime.

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