## EE-8391 Electromagnetic Theory

## Important 13mark questions

### Unit I

1. Write down the expressions for gradient, divergence, and curl in three co-ordinate systems.
2. A charge of 1 C is at (2, 0, 0). What charge must be placed at (-2, 0, 0) which will make y component of total E zero at the point (1, 2, 2)?

### Unit II

1. State and derive electric boundary condition for (1) a dielectric to dielectric medium, (2) a conductor to dielectric medium, and (3) free space to conductor.
2. Define the following:
   (i) Electric potential and potential difference
   (ii) Uniform and non uniform fields with examples
   (iii) Dielectric polarization and Dielectric Constant
   (iv) Capacitance and expression for energy stored in the capacitor.

### Unit III

1. Derive the expression for Biot-Savart Law Ampere's circuit law from the concept of magnetic vector potential and also derive Poisson's equation for magneto static field.
2. Show by means of Biot-Savart's law that the flux density produced by an infinitely long straight wire carrying a current 'T' at any point distant '$\rho$' normal to the wire is given by $\frac{\mu_0 \mu_r I}{2\pi\rho}$.

### Unit IV

1. A parallel plate capacitor with plate area of $5\ cm^2$ and plate separation of 3 mm has a voltage $50\ sin\ 10^3 t\ V$ applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\varepsilon_0$
2. Derive and explain the Maxwell's equations in Integral and differential forms.

### Unit V

1. Define wave. Derive the wave equation in terms of electric and magnetic fields for a conducting medium.
2. Explain in detail the bahavior of plane waves in loss less medium.