TOPIC : 3 ELECTRIC FLUX DENSITY
GAUSS LAW & DIVERGENCE

1. Determine $\bar{D}$ at (4,0,3) if there is a point charge -5π(mc) at (3,0,0) and a line charge 3π(mc) along y axis.

2. A charge configuration is given by $\rho_v = 5\rho\, e^{-2\rho}\ c/m^3$ Find $\bar{D}$ using Gauss's law.

3. Find the flux density at a point A (6, 4, -3) caused by (a) a point charge of 20mc at the origin. (b) a uniform line charge $\rho_l = 20\ Mc/m$ on the z axis. (c) a uniform sheet charge density $\rho_s = 60\ Mc/m^2$ at a plane $x = 8$.

4. State and Explain Gauss's law with its mathamatical proof.

5. Explain Gauss' law applied to Differential volume Element.

6. Explain Divergence's Theorem.

7. Find divergence D at the origin if
$$D = e^{-x}\cdot \sin y\, \bar{a_x} - e^{-x}\cdot \cos y\, \bar{a_y} + 2z\, \bar{a_z}$$

8. Let $D = 2y^2z^2\,\bar{a_x} + 3xy^2z^2\,\bar{a_y} + 2xyz\,\bar{a_z}\ pc/m^2$ in free space. Find (a) The total Electrical Flux passing through the surface $x = 2$, $0 \le y \le 2$, and $0 \le z \le 2$ in a direction away from the origin.
(b) The total charge contained in an incremental sphere of a radius 1 Mm centered at P(2, 2, 2).