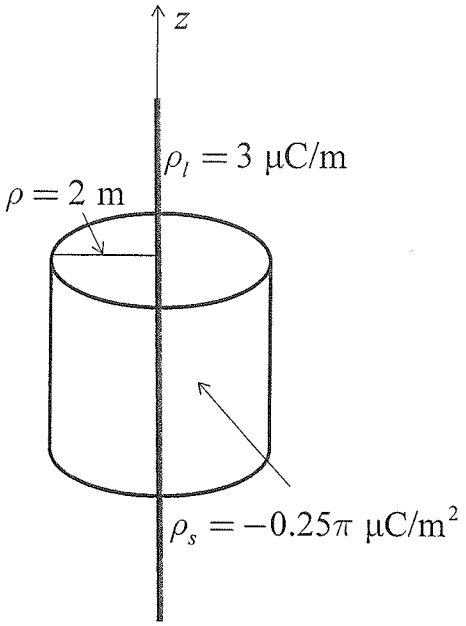
FO-1
August 2011 QE

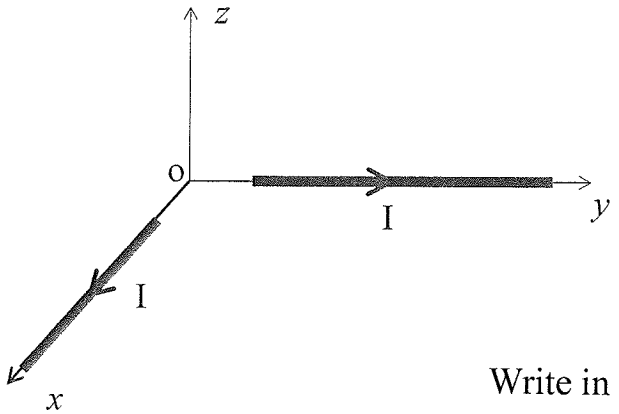
Problem 1 (30 points):

A uniform line charge of $\rho_l = 3$ μC/m lies along the z axis, and a concentric circuit cylinder of radius 2 m has $\rho_s = -0.25\,\pi$ μC/m^2, as shown in the figure below. Both distributions are infinite in extent with z, find $\vec{D}$ in all regions, i.e., $0 < \rho < 2$ and $\rho > 2$ regions.



Problem 2 (30 points):

There are two semi-infinite line currents. One is placed along x-axis extending from x = 1 m to infinity; the other is placed along y-axis extending from y = 1 m to infinity as shown in figure below. Find **H** field at the origin point O (0,0,0).



Write in Exam Book Only

Problem 3 (40 points):

Please provide a proof to each of the following facts:

(1) On the surface of a perfect electric conducting object, electric field line is always perpendicular to the conductor surface.
(2) The electric field line is always perpendicular to the equal potential surface.