# Fields and Waves
# Tutorial-8 15th March, 2016

Ques1: A coaxial line carries the same current I up inside the conductor of radius R1 as down the outer conductor of radius R2 and outer radius R3. Find the magnetic field intensity at all distances from the center of the conductor.

Ques2: An infinitely long conductor of radius a carries a uniform current with$J = J_o\hat{a}_z$. Show that the magnetic vector potential for $\rho < a\ is$:

$$\vec{A} = -\frac{1}{4}\mu_o J_o \rho^2 \hat{a}_z$$

Ques3: A circular loop located on $x^2 + y^2 = 9, z = 0$ carries a direct current of 10 A along $\hat{a}_\emptyset$ . Determine $\vec{H}$ at (0, 0, 4) and (0, 0, -4)

## Home Assignment to be submitted and discussed during tutorial session.

Ques1: Show that the magnetic field cannot do any work on a particle, i.e., cannot change its energy.

Ques2: Which of these Magnetic fields can exist? Determine the current density that created the valid fields. What Vector Potential corresponds to these fields?

(a)$\vec{B}(\vec{r}) = e^{y^2}\widehat{a_x}$

(b) $\vec{B}(\vec{r}) = e^{x^2}\widehat{a_x}$

(c) $\vec{B}(\vec{r}) = \sin(kr)\hat{r}$ (r ,θ ,z coordinate system)

(d) $\vec{B}(\vec{r}) = r\hat{\theta}$ (r , θ, z coordinate system)