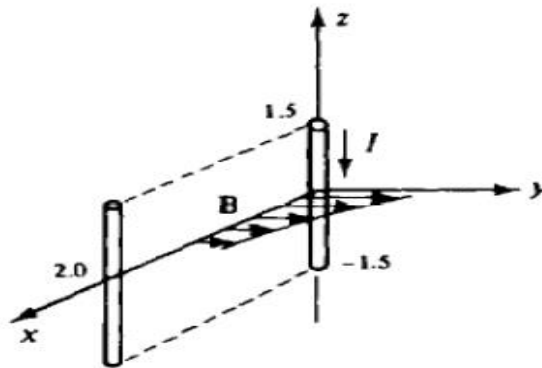Lab10 (1/4/16)

Question.1

A Radial field $\vec{H}=\frac{2.39 \times 10^6}{r}$ cos(ϕ) $\hat{r}$ A/m exists in free space. Write a MATLAB program to find the magnetic flux φ crossing the surface defined by $-\frac{\Pi}{4} \le \phi \le \frac{\Pi}{4}, 0 \le z \le 1m$.

Question.2

A conductor lies along the z-axis at -1.5≤ z ≤1.5m and carries a fixed current of 10A in the $\hat{z}$ direction. For a field $\vec{B}=3.0 \times 10^{-4}e^{-0.2x}$ $\hat{y}$ (T).

Write a MATLAB program to find the work and power required to move the conductor at constant speed to x=2.0m, y=0 in 5×10^{-3}s. Assume parallel motion along the x axis.

Question.3

In a material for which σ=5.0 S/m and ε_r=1 the electric field intensity is $\vec{E}$=250 sin(10^{10}t) V/m. Write a MATLAB program to find the conduction and displacement current densities, and the frequency at which they have equal magnitudes.

Question.4(HA)

In a region 1 of fig below, $\overrightarrow{B_1}$=1.2$\hat{x}$ +0.8$\hat{y}$ +0.4$\hat{z}$ (T). Write a MATLAB program to find $\overrightarrow{H_2}$(i.e. at z=+0) and the angles between the field vectors and a tangent to the surface.