IILM UNIVERSITY

Tutorial No. : 01 (Module 1: Electromagnetic Theory)			
Subject	**Physics**	**Subject Code**	**UBS1002**

1. For a conducting medium, $\sigma = 58\times10^{6}$ Siemen/m, $\varepsilon_r = 1$, find out the conduction and displacement current densities, if the magnitude of electric field intensity E is given by $E = 150\sin(10^{10}t)$ Volt/m. (Given $\varepsilon_0 = 8.85\times10^{-12}$ C/N – m^2)
2. In a material for which $\sigma = 5$ Siemen/m, $\varepsilon_r = 1$, the electric field intensity is $E = 250\sin(10^{10}t)$ Volt/m. Find the frequency at which magnitude of conduction and displacement current densities are equal.
3. If the magnitude of H in a plane wave is 1 Amp/m in free space. Find the magnitude of **E** for plane wave in free space.
4. A 100 W sodium lamp radiating its power. Calculate the electric field and magnetic field strength at a distance of 5 m from the lamp.
5. If the earth receives 2 cal min^{-1} cm^{-2} solar energy, what are the amplitudes of electric and magnetic fields of radiation?
6. Assuming that all the energy from a 1000 W lamp is radiated uniformly; calculate the average values of the intensities of electric and magnetic fields of radiation at a distance of 2 m from the lamp.
7. The sunlight strikes the upper atmosphere of earth with energy flux 1.38 kW/m^2. What will be the peak values of electric and magnetic fields at the points?
8. If the upper atmospheric layer of earth receives 1360 watt/m^2 energy from the sun, what will be the peak values of electric and magnetic fields at the layer?
9. Find the skin depth (δ) at a frequency of 3.0x10^6 Hz in aluminum, where $\sigma = 38.0\times10^{6}$ Siemen/m, $\mu_r = 1$. Also calculate wave velocity.
10. If the ocean water is considered to be dielectric then find the permeability of the medium for which dielectric constant K=80, penetration depth is 10 cm and $\sigma = 4.3$ mho/m
11. The relative permittivity of distilled water is 81. Calculate refractive index and velocity of light in it.
12. Calculate the magnitude of Poynting vector at the surface of the sun. Given that power radiated by sun = 5.4x10^{28} watts and radius of sun is 7.0x10^8 m.