Faculty of Engineering, University of Lucknow

Important Questions Unit 3

Engineering Physics – II

B. Tech. First year ***Branch: CSE, EE, EC, ME, CE*** ***Questions***

- *Before starting the assignment first remove all confusion about the concept used in questions of assignment.*
- *Each Assignment carries equal marks in the internal marks of the subject.*

UNIT III: Electromagnetic Theory

SECTION-A: Short Answer Questions

1. What are electromagnetic waves? Define propagation constant.
2. Explain equation of continuity and its physical significance
3. Discuss the physical significance of poynting theorem.
4. What is skin depth? Explain its physical significance.

SECTION-B: Numericals

1. 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?
2. The maximum electric field in a plane electromagnetic wave is 10^2 N/C . The wave is going in the X - direction and the electric field is in the Y -direction. Find the maximum magnetic field in the wave and its direction.
3. Find the skin depth at frequency 3 MHz in aluminum where $\sigma = 3.8 \times 10^7$ S/m and $\mu_r = 1$. Also find the propagation constant and velocity.
4. A plane electromagnetic wave propagating in the X -direction has a wavelength 7mm. The electric field is in Y -direction and its maximum magnitude is 42 v/m. Write suitable equations for E, B and H as a function of x and t.

SECTION-C: Long answer questions:

1. Explain the concept of displacement current and show how it led to the modification of Ampere's law.
2. a) Write down Maxwell's equations in free space and in conducting media. Using these equations derive wave equations for both electric and magnetic fields.
   b) Show that electromagnetic waves are transverse in nature.