# Electromagnetic Waves

**Displacement Current**

$$I_D = \varepsilon_0 . \frac{d\phi_E}{dt}$$

**The equation of plane progressive electromagnetic wave**

$$E = E_0 \sin \omega \left(t - \frac{x}{c}\right)$$

$$B = B_0 \sin \omega \left(t - \frac{x}{c}\right) a$$

**Poynting Vector**

The rate of flow of energy in an electromagnetic wave is described by the vector S called the poynting vector

$$S = \frac{1}{\mu_0}(E \times B)$$

**The average electric energy density**

$$U_E = \frac{1}{2}\varepsilon_0 E^2 = \frac{1}{4}\varepsilon_0 E_0^2$$

**The average magnetic energy density**

$$U_E = \frac{1}{2}\frac{B^2}{\mu_0} = \frac{1}{4}\frac{B_0^2}{\mu_0}$$