Girirdhar Kumar

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SEM-IV Unit-I paper-06

Very short Questions with Answer (2 Marks).

(1) Write expression for electromagnetic energy density.

Ans→ $$u = \frac{1}{2}\varepsilon_0 E^2 + \frac{1}{2\mu_0} B^2$$

(2) Define Poynting vector.

Ans- Poynting vector represents energy flow per unit area.

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

Unit :- W/m^2.

(3) Calculate energy density of electric field if $E = 5 \times 10^3$ V/m

Ans- ∵ Energy density

$$u_E = \frac{1}{2}\varepsilon_0 E^2$$

$$= \frac{1}{2}(8.85 \times 10^{-12})(5 \times 10^3)^2$$

$$= 1.11 \times 10^{-4} J/m^3$$

(4) Calculate momentum density if $S = 3 \times 10^5$ W/m^2.

Ans! ∵ $$g = \frac{S}{c^2}$$

$$= \frac{3 \times 10^5}{(3 \times 10^8)^2} = \frac{8 \times 10^5}{9 \times 10^{16}} = \frac{1}{3} \times 10^{-11}$$

$$= 3.3 \times 10^{-12} \, Kg\, m^{-2} s^{-1}$$