



## Ch—08 Electromagnetic Wave

### Daily Practice Problem 02

**Q1.** The magnetic field in a plane electromagnetic wave is given by:  $B_y = 12 \times 10^{-8} \sin(1.20 \times 10^7 z + 3.60 \times 10^{15} t) T$

Calculate:

(i) The energy density associated with the electromagnetic wave.

(ii) The speed of the wave. [CBSE SP 181]

**Q2.** The average energy-density of electromagnetic wave given by  $E = (50 N/C) \sin(\omega t - kx)$  will be nearly

- (a)  $10^{-8} J/m^3$
- (b)  $10^{-7} J/m^3$
- (c)  $10^{-6} J/m^3$
- (d)  $10^{-5} J/m^3$

**Q3.** A flood light is covered with a filter that transmits red light. The electric field of the emerging beam is represented by a sinusoidal plane wave  $E_x = 36 \sin(1.20 \times 10^7 z - 3.6 \times 10^{15} t) V/m$ . The average intensity of beam in  $W/m^2$  will be

- (a) 6.88
- (b) 3.44
- (c) 1.72
- (d) 0.86

**Q4.** The sun delivers  $10^3 W/m^2$  of electromagnetic flux to the earth's surface. The total power that is incident on a roof of dimensions  $8 m \times 20 m$  will be

- (a)  $2.56 \times 10^4 W$
- (b)  $6.4 \times 10^5 W$
- (c)  $4.0 \times 10^5 W$
- (d)  $1.6 \times 10^5 W$

**Q5.** A plane electromagnetic wave of wave intensity  $6 W/m^2$  strikes a small mirror of area  $39 cm^2$ , held perpendicular to the approaching wave. The momentum transferred in  $kg ms^{-1}$  by the wave to the mirror each second will be

- (a)  $1.2 \times 10^{-10}$
- (b)  $2.4 \times 10^{-9}$
- (c)  $3.6 \times 10^{-8}$
- (d)  $4.8 \times 10^{-7}$

**Q6.** In a region of free space the electric field at some instant of time is  $\vec{E} = (80\hat{i} + 32\hat{j} - 64\hat{k}) V/m$  and the magnetic field is  $\vec{B} = (0.2\hat{i} + 0.08\hat{j} - 0.29\hat{k}) \mu T$ . The pointing vector for these fields is

- (a)  $-11.52\hat{i} + 28.8\hat{j}$
- (b)  $-28.8\hat{i} + 11.52\hat{j}$

(c)  $28.8\hat{i} - 11.52\hat{j}$ .

(d)  $11.52\hat{i} - 28.8\hat{j}$

---

**ANSWERS**

1. (a)  $7.3 \times 10^{-9} \text{ Jm}^{-3}$

(b)  $3 \times 10^8 \text{ ms}^{-1}$

2. a

3. c

4. d

5. a

6. d