

Topic :-Electromagnetic Waves

- A perfectly reflecting mirror has an area of 1 cm^2 Light energy is allowed to fall on it for 1h at the rate of 10 Wcm^{-2} . The force that acts on the mirror is
a) $3.35 \times 10^{-8} \text{ N}$ b) $6.7 \times 10^{-8} \text{ N}$ c) $1.34 \times 10^{-7} \text{ N}$ d) $2.4 \times 10^{-4} \text{ N}$
- A radio wave of frequency 90 MHz enters a ferrite rod. If $\epsilon_r = 10^3$ and $\mu_r = 10$, then the velocity and wavelength of the wave in ferrite are
a) $3 \times 10^8 \text{ ms}^{-1}; 3.33 \times 10^{-2} \text{ m}$ b) $3 \times 10^6 \text{ ms}^{-1}; 3.33 \times 10^{-2} \text{ m}$
c) $3 \times 10^8 \text{ ms}^{-1}; 3.33 \times 10^{-1} \text{ m}$ d) $3 \times 10^7 \text{ ms}^{-1}; 3.33 \times 10^{-3} \text{ m}$
- The Electromagnetic theory of light failed to explain
a) Photoelectric effect b) Polarization c) Diffraction d) Interference
- Which of the following electromagnetic waves have the longest wavelength?
a) Heat waves b) Light waves c) Radio waves d) Ultraviolet waves
- The oscillating electric and magnetic field vectors of electromagnetic wave are oriented along
a) The same direction and in phase b) The same direction but have a phase difference of 90°
c) Mutually perpendicular directions and are in phase d) Mutually perpendicular directions but has a phase difference of 90°
- Electromagnetic Waves can be deflected by
a) Electric field only b) Magnetic field only
c) Both (a) and (b) d) None of these
- The sun delivers 10^3 Wm^{-2} of Electromagnetic flux on the earth's surface. The total power that is incident on a roof of dimensions $6\text{m} \times 30\text{m}$, is
a) $1.8 \times 10^5 \text{ W}$ b) $7.2 \times 10^5 \text{ W}$ c) $0.9 \times 10^5 \text{ W}$ d) $4.5 \times 10^5 \text{ W}$
- What is order of energy of X-rays (E_X), radio waves (E_R) and microwave (E_M)?
a) $E_X < E_R < E_M$ b) $E_X < E_M > E_R$ c) $E_M > E_X > E_R$ d) $E_M < E_R < E_X$
- A plane Electromagnetic Wave of frequency 30 MHz travels in free space along the x -direction. The electric field component of the wave at a particular point of space and time $E=6 \text{ Vm}^{-1}$ along y -direction. Its magnetic field component B at this point would be
a) $2 \times 10^{-8} \text{ T}$ along z -direction b) $6 \times 10^{-8} \text{ T}$ along x -direction
c) $2 \times 10^{-8} \text{ T}$ along y -direction d) $6 \times 10^{-8} \text{ T}$ along z -direction
- Ozone layer blocks the radiations of wavelength
a) Less than $3 \times 10^{-7} \text{ m}$ b) Equal to $3 \times 10^{-7} \text{ m}$

- c) More than $3 \times 10^{-7} \text{m}$ d) All of the above
11. If c is the speed of Electromagnetic Waves in vacuum, its speed in a medium of dielectric constant K and relative permeability μ , is

a) $v = \frac{1}{\sqrt{\mu_r K}}$ b) $v = c\sqrt{\mu_r K}$ c) $v = \frac{c}{\sqrt{\mu_r K}}$ d) $v = \frac{K}{\sqrt{\mu_r c}}$

12. The Maxwell's four equations are written as

(i) $\oint \vec{E} \cdot d\vec{s} = q/\epsilon_0$
 (ii) $\oint \vec{B} \cdot d\vec{s} = 0$
 (iii) $\oint \vec{E} \cdot d\vec{l} = -\frac{d}{dt} \oint \vec{B} \cdot d\vec{s}$
 (iv) $\oint \vec{B} \cdot d\vec{l} = \mu_0 I + \mu_0 \epsilon_0 \frac{d}{dt} \oint \vec{E} \cdot d\vec{s}$

The equation which have sources of \vec{E} and \vec{B} are

- a) (i), (ii), (iii) b) (i), (ii) c) (i) and (iii) only d) (i) and (iv) only
13. The waves which are reflected back to the earth by ionosphere is

- a) Ground wave b) Sky wave c) Space wave d) All of these

14. The relation between electric field vector \vec{E} , the displacement vector \vec{D} and the polarization vector \vec{P} for a dielectric placed in electric field \vec{E} is given by

a) $\vec{P} = \epsilon_0 \vec{E} + \vec{D}$ b) $\vec{P} = \vec{D} + \vec{E}$ c) $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$ d) $\vec{E} = \vec{D} + \vec{P}$

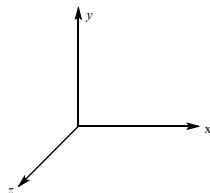
15. The refractive index and the permeability of a medium are respectively 1.5 and $5 \times 10^{-7} \text{Hm}^{-1}$. The relative permittivity of the medium is nearly

- a) 25 b) 15 c) 81 d) 6

16. If \vec{E} is an electric field and \vec{B} is the magnetic induction then the energy flow per unit area per unit time in an electromagnetic field is given by

a) $\vec{E} \times \vec{B}$ b) $\vec{E} \cdot \vec{B}$ c) $E^2 + B^2$ d) E/B

17. Light wave is travelling along y -direction. If the corresponding \vec{E} vector at any time is along the x -axis, the direction of \vec{B} vector at that time is along



a) y -axis

b) x -axis

c) $+z$ -axis

d) $-z$ -axis

This section contains 0 questions numbered 1 to 0. Each question contains STATEMENT 1 (Assertion) and STATEMENT 2 (Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

a) Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1

b) Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1

c) Statement 1 is True, Statement 2 is False

d) Statement 1 is False, Statement 2 is True

18.

1:Statement If earth did not have atmosphere, its average surface temperature would be lower than what is now

2:Statement Green house effect of the atmosphere would be absent if earth did not have atmosphere

19.

1:Statement The electromagnetic wave is transverse in nature

2:Statement The waves propagate in straight line

20.

1:Statement X-ray astronomy is possible only from satellites orbiting the earth

2:Statement Efficiency of X-ray telescope is large as compared to any other telescope