

# CLASS XII

## PHYSICS

### Electromagnetic Waves

Date :

Batch :

1. What is the main source of electromagnetic waves ?
2. What is the reason for the production of electromagnetic waves ?
3. Write down the electromagnetic waves in the order of increasing wavelengths :  
Microwaves,  $\gamma$ -rays, radio waves, ultraviolet rays :
4. What is wavelength of visible spectrum ?
5. What is the wavelength of X-rays ?
6. What is the difference between X-rays and  $\gamma$ -rays ?
7. Why red light is used in photographic room ?
8. Write the use of infrared radiations and ultraviolet in the field of medical science.
9. Write four properties of ultraviolet radiations.
10. What are electromagnetic waves? Write any four properties
11. The sunlight reaching the earth has maximum electric field of  $810 \text{ Vm}^{-1}$ . What is its maximum magnetic field in this light?
12. In a plane electromagnetic wave, the sinusoidal electrical oscillations have a frequency of  $5 \times 10^{10} \text{ Hz}$  and amplitude  $48 \text{ Vm}^{-1}$ . Calculate its wavelength and the amplitude of oscillating magnetic field.
13. Electromagnetic waves travel in a medium at a speed of  $2 \times 10^8 \text{ m/s}$ . The relative permeability of the medium is 1.0. Find the relative permittivity. (**Ans.** 2.25)
14. A plane electromagnetic wave is propagating in the X-direction has a wavelength of 6mm. The electric field is in the Y-direction and its maximum magnitude is  $30 \text{ Vm}^{-1}$ . Write a suitable equation for the electric field.
15. In a plane electromagnetic wave of frequency  $1 \times 10^{12} \text{ Hz}$ , the amplitude of the magnetic field is  $5 \times 10^{-6} \text{ T}$ . Calculate the amplitude of the electric field and what is the total average energy density of the electromagnetic wave ?  
(**Ans.**  $1.5 \times 10^3 \text{ Vm}^{-1}$ ,  $1.0 \times 10^{-5} \text{ Jm}^{-3}$  )

16. Find the maximum electric field and the average energy density corresponding to electric field.
17. A millimetre wave has a wavelength of 2.00 mm and the oscillating electric field associated with it has an amplitude of 20 V/m. Determine the frequency of oscillations of the electric and magnetic fields of this electromagnetic wave. What is the amplitude of the magnetic field oscillations of this wave ?
18. In a plane electromagnetic wave, the electric field varies with time having an amplitude of  $IVm^{-1}$ . The frequency of wave is  $0.5 \times 10^{15} Hz$ . The wave is propagating along z axis. What is the average energy density of :Electric field, (ii) Magnetic field, (iii) Total What is the amplitude of magnetic field ?
19. What is the drawback of ampere circuital law? Explain.
20. What is the modification done by Maxwell in ampere circuital law?
21. Find the expression of displacement current.
22. Write all equation of Maxwell of electromagnetic wave.
23. Show that refractive index is root of product of electric permittivity and magnetic permeability.
24. Find expression of electric field energy density.
25. Find expression of magnetic field energy density.
26. What is electromagnetic spectrum, what are the type of electromagnetic wave, explain.