

Topic :-Electromagnetic Waves

- If ϵ_0 and μ_0 represent the permittivity and permeability of vacuum and ϵ and μ represent the permittivity and permeability of medium, then refractive index of the medium is given by
 - $\sqrt{\frac{\mu_0\epsilon_0}{\mu\epsilon}}$
 - $\sqrt{\frac{\mu\epsilon}{\mu_0\epsilon_0}}$
 - $\sqrt{\frac{\mu}{\mu_0\epsilon_0}}$
 - $\sqrt{\frac{\mu_0\epsilon_0}{\mu}}$
- The magnetic field between the plate of a capacitor where $r > R$ is given by (where r is the distance from the axis of plates and R is the radius of each plate of capacitor)
 - $\frac{\mu_0 i_D r}{2\pi R^2}$
 - $\frac{\mu_0 i_D}{2\pi R}$
 - $\frac{\mu_0 i_D}{2\pi r}$
 - Zero
- The amplitude of the magnetic field part of a harmonic Electromagnetic Wave in vacuum is $B_0=510$ nT. What is the amplitude of the electric field part of the wave?
 - 140 NC⁻¹
 - 153 NC⁻¹
 - 163 NC⁻¹
 - 133 NC⁻¹
- In an Electromagnetic Wave, direction of propagation is in the direction of
 - \mathbf{E}
 - \mathbf{B}
 - $\mathbf{E} \times \mathbf{B}$
 - None of these
- Consider the following two statements regarding a linearly polarized plane electromagnetic wave
 - Electric field and the magnetic field have equal average values
 - Electric energy and the magnetic energy have equal average values
 - (i) is true
 - (ii) is true
 - Both are true
 - Both are false
- A radiation of 200 W is incident on a surface which is 60% reflecting and 40% absorbing. The total force on the surface is
 - 1.07×10^{-6} N
 - 1.3×10^{-6} N
 - 1.07×10^{-7} N
 - 1.03×10^{-7} N
- An electric field $\vec{\mathbf{E}}$ and magnetic field $\vec{\mathbf{B}}$ exist in a region. If these fields are not perpendicular to each other, then the electromagnetic wave
 - Will not pass through the region
 - Will pass through region
 - May pass through the region
 - Nothing is definite
- A radiowave has a maximum magnetic field induction of 10^{-4} T on arrival at a receiving antenna. The maximum electric field intensity of such a wave is
 - Zero
 - 3×10^4 Vm⁻¹
 - 5.8×10^{-4} T
 - 3.0×10^{-5} T

9. According to Maxwell's hypothesis, changing electric field gives rise to
 a) Magnetic field b) Pressure gradient c) Charge d) Voltage
10. The rms value of the electric field of the light coming from the sun is 720 NC^{-1} . The average total energy density of the Electromagnetic Wave is
 a) $4.58 \times 10^{-6} \text{ Jm}^{-3}$ b) $6.37 \times 10^{-9} \text{ Jm}^{-3}$ c) $81.35 \times 10^{-12} \text{ Jm}^{-3}$ d) $3.3 \times 10^{-3} \text{ Jm}^{-3}$
11. The magnetic field of an Electromagnetic Wave is given by
 $B_y = 3 \times 10^{-7} \sin(10^3x + 6.29 \times 10^{12}t)$.
 The wavelength of the Electromagnetic Wave is
 a) 6.28 cm b) 3.14 cm c) 0.63 cm d) 0.32 cm
12. The shortest wavelength of X-rays emitted from an X-rays tube depends upon
 a) Nature of the gas in the tube b) Voltage applied to tube
 c) Current in the tube d) Nature of target of the tube
13. Hydrogen atom does not emit X-rays because
 a) It has single electron b) It has no neutron
 c) It has single neutron d) Its energy levels are too close to each other
14. In a medium of dielectric constant K , the electric field is \mathbf{E} . If ϵ_0 is permittivity of the free space, the electric displacement vector is
 a) $\frac{K\mathbf{E}}{\epsilon_0}$ b) $\frac{\mathbf{E}}{K\epsilon_0}$ c) $\frac{\epsilon_0\mathbf{E}}{K}$ d) $K\epsilon_0\mathbf{E}$
15. The wavelength of X-rays lies between
 a) Maximum to finite limits b) Minimum to certain limits
 c) Minimum to infinite limits d) Infinite to finite limits
16. The electric field (in NC^{-1}) in an electromagnetic wave is given by $E = 50\sin \omega(t - x/c)$. The energy stored in a cylinder of cross-section 10 cm^2 and length 100 cm, along the x -axis will be
 a) $5.5 \times 10^{-12} \text{ J}$ b) $1.1 \times 10^{-11} \text{ J}$ c) $2.2 \times 10^{-11} \text{ J}$ d) $1.65 \times 10^{-11} \text{ J}$
17. All components of the Electromagnetic Spectrum in vacuum have the same
 a) Energy b) Velocity c) Wavelength d) Frequency
18. Which of the following has zero average value in a plane electromagnetic wave?
 a) Kinetic energy b) Magnetic field c) Electric field d) Both (b) and (c)
19. A large parallel plate capacitor, whose plates have an area of 1 m^2 and are separated from each other by 1 mm, is being charged at a rate of 25 Vs^{-1} . If the dielectric between the plates has the dielectric constant 10, then the displacement current at this instant is
 a) $25 \mu\text{A}$ b) $11 \mu\text{A}$ c) $2.2 \mu\text{A}$ d) $1.1 \mu\text{A}$
20. The atmosphere between the heights of 50 km and 80 km is called
 a) Mesosphere b) Ozonosphere c) Ionosphere d) Troposphere