DPP
DAILY PRACTICE PROBLEMS

Class : XIIth   Subject : PHYSICS
Date :   DPP No. : 1

Topic :-Electromagnetic Waves

1. In an electromagnetic wave, the electric and magnetizing fields are 100 Vm^{-1} and 0.265 Am^{-1}. The maximum energy flow is
    a) 26.5 Wm^{-2} b) 36.5 Wm^{-2} c) 46.7 Wm^{-2} d) 765 Wm^{-2}

2. X-ray are not used for radar purpose, because they are not
    a) Reflected by target   b) Partly absorbed by target
    c) Electromagnetic waves   d) Completely absorbed by target

3. If an electromagnetic wave is propagation in a medium with permittivity ε and permittivity μ, then $\sqrt{\dfrac{\mu}{\varepsilon}}$ is the
    a) Intrinsic impedance of the medium   b) Square of the refractive index of the medium
    c) Refractive index of the medium   d) Energy density of the medium

4. An earth orbiting satellite has solar energy collecting panel with total area 5 m^2. If solar radiations are perpendicular and completely absorbed, the average force associated with the radiation pressure is
    (Solar constant $= 1.4 \text{ kWm}^{-2}$)
    a) $2.33 \times 10^{-3} \text{ N}$ b) $2.33 \times 10^{-4} \text{ N}$ c) $2.33 \times 10^{-5} \text{ N}$ d) $2.33 \times 10^{-6} \text{ N}$

5. For EM wave prorogating along x-axis, $E_{\max} = 30 \text{ Vm}^{-1}$. what is maximum value of magnetic field?
    a) 10^{-7} T b) 10^{-8} T c) 10^{-9} T d) 10^{-6} T

6. A parallel plate capacitor is charged to $60 \mu C$. Due to a radioactive source, the plate loss charge at the rate of $1.8 \times 10^{-8} \text{ Cs}^{-1}$. The magnitude of displacement current is
    a) $1.8 \times 10^{-8} \text{ Cs}^{-1}$ b) $3.6 \times 10^{-8} \text{Cs}^{-1}$ c) $4.1 \times 10^{-11} \text{Cs}^{-1}$ d) $5.7 \times 10^{-12} \text{ Cs}^{-1}$

7. If ε_0 and μ_0 are the electric permittivity and magnetic permeability of free space and ε and μ are the corresponding quantities in the medium, the index of refraction of the medium in terms of above parameter is
    a) $\dfrac{\varepsilon\mu}{\varepsilon_0\mu_0}$ b) $\left(\dfrac{\varepsilon\mu}{\varepsilon_0\mu_0}\right)^{1/2}$ c) $\left(\dfrac{\varepsilon_0\mu_0}{\varepsilon\mu}\right)$ d) $\left(\dfrac{\varepsilon_0\mu_0}{\varepsilon\mu}\right)^{1/2}$

8. According to Maxwell's hypothesis, a changing electric field gives rise to
    a) An emf   b) Electric current c) Magnetic field d) Pressure radiant

9. Electric fields induced by changing magnetic fields are
    a) Conservation   b) Non-conservation
    c) May be conservative or non-conservation d) Nothing can be said

depending on the conditions

10. The electric field of a plane electromagnetic wave varies with time of amplitude 2 Vm^{-1} propagating along z-axis. The average energy density of the magnetic field is (in Jm^{-3})
   a) 13.29×10^{-12} b) 8.86×10^{-12} c) 17.72×10^{-12} d) 4.43×10^{-12}

11. The sun delivers 10^4 Wm^{-2} of electromagnetic flux to the earth's surface. The total power that in incident on a roof of dimensions 10m square will be
   a) 10^4W   b) 10^5 W   c) 10^6 W   d) 10^7 W

12. Infrared radiation is detected by
   a) Spectrometer   b) Pyrometer   c) Nanometer   d) Photometer

13. Ground waves have wavelength
   a) Less than 200 m   b) Equal to 200 m   c) More than 200 m   d) All of these

14. A plane Electromagnetic Waves travelling along the X-direction has a wavelength of 3 mm. The variation in the electric field occurs in the Y-direction with an amplitude 66 Vm^{-1}. The equations for the electric and magnetic fields as a function of x and t are respectively

   a) $E_y = 33 \cos \pi \times 10^{11}\left(t - \dfrac{x}{c}\right),$
   $B_z = 1.1 \times 10^{-7} \cos \pi \times 10^{11}\left(t - \dfrac{x}{c}\right)$

   b) $E_y = 11 \cos 2\pi \times 10^{11}\left(t - \dfrac{x}{c}\right),$
   $B_y = 11 \times 10^{-7} \cos 2\pi \times 10^{11}\left(t - \dfrac{x}{c}\right)$

   c) $E_x = 33 \cos \pi \times 10^{11}\left(t - \dfrac{x}{c}\right),$
   $B_x = 11 \times 10^{-7} \cos \pi \times 10^{11}\left(t - \dfrac{x}{c}\right)$

   d) $E_y = 66 \cos 2\pi \times 10^{11}\left(t - \dfrac{x}{c}\right),$
   $B_z = 2.2 \times 10^{-7} \cos 2\pi \times 10^{11}\left(t - \dfrac{x}{c}\right)$

15. The frequency 1057 MHz of radiation arising from two close energy levels in hydrogen belongs to
   a) Radio waves   b) Infrared waves   c) Micro waves   d) γ − rays

16. Maxwell in his famous equation of electromagnetism introduced the concept
   a) AC current   b) DC current   c) Displacement current   d) Impedance

17. In a plane electromagnetic wave electric field varies with time having an amplitude 1 Vm^{-1}. The frequency of wave is 0.5×10^{15} Hz. The wave is propagation along X-axis. What is the average energy density of magnetic field?
   a) 1.1×10^{-12}J m^{-3} b) 2.2×10^{-12}J m^{-3} c) 3.3×10^{-12}J m^{-3} d) 4.4×10^{-12}J m^{-3}

18. An Electromagnetic Wave of frequency $v = 3.0$ MHz passes from vacuum into a dielectric medium with permittivity $\varepsilon = 4.0$. Them
   a) Wavelength is doubled and the frequency remains unchanged
   b) Wavelength is doubled and frequency becomes half
   c) Wavelength is halved and frequency remains unchanged
   d) Wavelength and frequency both become unchanged

19. The amplitude of electric field in a parallel beam of light of intensity 4 Wm^{-2} is

   a) 40.5 NC^{-1} b) 45.5 NC^{-1} c) 50.5 NC^{-1} d) 55.5 NC^{-1}

20. Assume that a lamp radiates power P uniformly in all directions. What is the magnitude of electric field strength at a distance r from the lamp?

   a) $\dfrac{P}{\pi c \varepsilon_0 r^2}$ b) $\dfrac{P}{2\pi c \varepsilon r^2}$ c) $\sqrt{\dfrac{P}{2\pi \varepsilon_0 r^2 c}}$ d) $\sqrt{\dfrac{P}{\pi \varepsilon_0 c r^2}}$