DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 6

Topic :- Electromagnetic Waves

1 **(b)**

The density of air in mesosphere with height decreases from $1/10^3$ to $1/10^5$ times that due to the surface of earth

2 **(d)**

Intensity of electromagnetic wave is $I = \frac{P_{av}}{4\pi \times r^2} = \frac{E_0^2}{2\mu_0 c}$

or $E_0 = \sqrt{\frac{\mu_0 c P_{av}}{2\pi r^2}}$

$= \sqrt{\frac{(4\pi \times 10^{-7}) \times (3 \times 10^8) \times 800}{2\pi \times (4)^2}}$

$= 54.77 \text{ Vm}^{-1}$

3 **(d)**

The earth's atmosphere above the height of 80 km up to 400 km is called Ionosphere

4 **(a)**

$d = \sqrt{2hR}$ or $h = d^2/2R$

7 **(c)**

$i = \frac{dq}{dt} = \frac{d}{dt}(q_0 \sin 2\pi f t) = q_0 2\pi f \cos 2\pi f t$

8 **(a)**

Here, $\lambda = \frac{c}{v} = \frac{3 \times 10^8}{8.2 \times 10^6} = 36.6 \text{ m}$

9 **(c)**

Here, $E = 1500 \text{ Vm}^{-1}$, $B = 0.4 \text{ Wbm}^{-2}$

Minimum speed of electron along the straight line

$$v = \frac{E}{B} = \frac{1500}{0.4} = 3750$$
$$= 3.75 \times 10^3 \text{ ms}^{-1}$$

10 **(c)**

$v = E/h = 3.3 \times 10^{-6} / 6.6 \times 10^{-34}$
$= 5 \times 10^{17}$ Hz

11 **(d)**

Given , frequency of EM waves
$$v = 8.196 \times 10^6 \text{ Hz}$$
Velocity of EM waves $(v) = 3 \times 10^8$ m/s
$\therefore$ Wavelength of EM waves $\lambda = \frac{v}{V}$
$$= \frac{3 \times 10^8}{8.196 \times 10^6} = 36.60 \text{ m}$$
$$= 3660 \text{ cm}$$

12 **(a)**

The phase velocity of a wave is rate at which the phase of the wave propagates in space. This is the speed at which the phase of any one frequency component of the wave travels. For such a component, any given phase of the wave will appear to travel at the phase velocity. It is given in terms of wave's angular velocity ω and wave number k by $v_p = \frac{\omega}{k}$.

13 **(d)**

The electron placed in the path of electromagnetic wave will experience force due to electric field vector and not due to magnetic field vector

15 **(b)**

$c = \frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ and $c = E_0/B_0$

16 **(b)**

Velocity of light in a medium,
$$c = \frac{1}{\sqrt{\mu_0 \varepsilon_0 \mu_r \varepsilon_r}} = \frac{1}{\sqrt{\mu \varepsilon}}$$

18 **(c)**

Here, $kx = \theta$ or $k = \theta/x$
And $\omega t = \theta_0$ or $\omega = \theta_0/t$
$\therefore$ $k/\omega = t/x = 1/(x/t) = \frac{1}{v}$, where v is the velocity of electromagnetic wave, which is independent of wavelength of wave but depends upon the nature of medium of propagation of wave

19 **(d)**

Ultraviolet is absorbed by the ozone layer.

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	D	D	A	C	A	C	A	C	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	A	D	B	B	B	D	C	D	A