DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : PHYSICS
DPP No. : 2

Topic :- Electromagnetic Waves

1 **(c)**
The wavelengths of infrared rays lie between 7800 Å to 0.004 cm

3 **(a)**
As **v** of charged particle is remaining constant, it means force acting on charged particle is zero.
So, $q(\mathbf{v} \times \mathbf{B}) = q\mathbf{E}$

$$\Rightarrow \quad \mathbf{v} \times \mathbf{B} = \mathbf{E}$$
$$\Rightarrow \quad \mathbf{v} = \frac{\boldsymbol{E} \times \boldsymbol{B}}{B^2}$$

6 **(b)**
Range, $R = \sqrt{2hr}$ where r is the radius of earth so $R \propto h^{1/2}$

7 **(d)**
$$B_0 = \frac{E_0}{c} = \frac{9 \times 10^3}{3 \times 10^8} = 3 \times 10^{-5} \text{ T}$$

8 **(a)**
$$i = \frac{dQ}{dt} = \frac{d}{dt}(CV)$$
$$= C\frac{dV}{dt} = 2 \times 10^{-12} \times 10^{12} = 2 \text{ A}$$

9 **(b)**
When thermal radiations (Q) fall on a body, they are partly reflected, partly absorbed and partly transmitted.
$$Q = Q_a + Q_r + Q_t$$
And $\quad \frac{Q_a}{Q} + \frac{Q_r}{Q} + \frac{Q_t}{Q} = a + r + t = 1$

$\Rightarrow \quad \frac{15}{150} + 0.6 + x = 1$
or $\quad 0.1 + 0.6 + x = 1$
or $\quad x = 0.3$

Transmitting power, $t = \frac{Q_t}{Q}$
Or $\quad 0.3 = \frac{Q_t}{150}$
$\Rightarrow \quad Q_t = 45 \text{ J}$

10 **(a)**
Intensity or power per unit area of the radiations,
$$P = pv$$

$$\Rightarrow \qquad p = \frac{P}{v}$$

$$= \frac{0.5}{3 \times 10^8} = 0.166 \times 10^{-8} \text{ Nm}^{-2}$$

11 **(c)**

The frequency of Electromagnetic Waves produced by the oscillator is equal to the frequency of the oscillating particle $ie, 10^9$ Hz.

12 **(c)**

Velocity of light, $c = \frac{1}{\sqrt{\mu_0 \varepsilon_0}}$

or $\mu_0 \varepsilon_0 = \frac{1}{c^2} = \frac{1}{(\text{ms}^{-1})^2} = \text{s}^2 \text{m}^{-2}$

15 **(d)**

The wavelength order of the given types of waves are given below

Waves Wavelength Range (in meter)

Gamma rays $\qquad 10^{-14} - 10^{-10}$

IR-rays $\qquad 7 \times 10^{-7} = 10^{-3}$

UV-rays $\qquad 10^{-9} - 4 \times 10^{-7}$

Microwave $\qquad 10^{-4} - 10^0$

Hence, statements (A) and (D) are correct.

16 **(c)**

The speed of light in vacuum is given by $\sqrt{\frac{1}{\mu_0 \varepsilon_0}}$, where μ_0 is permeability and ε_0 is permittivity of free space.

17 **(c)**

Radiation force=momentum transferred per sec by electromagnetic wave to the mirror

$$= \frac{2S_{av}A}{c} = \frac{2 \times (10) \times (20 \times 10^{-4})}{(3 \times 10^8)}$$

$$= 1.33 \times 10^{-10} \text{ N}$$

18 **(a)**

Using the relation

$$c = \frac{E_0}{B_0} \qquad\qquad\qquad\qquad B_0 = \frac{E_0}{c}$$

$$= \frac{9.3}{3 \times 10^8} = 3.1 \times 10^{-8} \text{ T}$$

20 **(b)**

Radioactive source, X-ray tube, sodium vapour lamp, crystal oscillator

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