DPP
DAILY PRACTICE PROBLEMS

Class : XIIth | **Solutions** | **Subject : PHYSICS**
Date : | **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, $q(\mathbf{v} \times \mathbf{B}) = q\mathbf{E}$

$\Rightarrow \quad \mathbf{v} \times \mathbf{B} = \mathbf{E}$

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

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 $0.1 + 0.6 + x = 1$

or $x = 0.3$

Transmitting power, $t = \frac{Q_t}{Q}$

Or $0.3 = \frac{Q_t}{150}$

$\Rightarrow$ $Q_t = 45$ J

10 **(a)**

Intensity or power per unit area of the radiations,

$P = pv$

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

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

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	$10^{-14} - 10^{-10}$
IR-rays	$7 \times 10^{-7} = 10^{-3}$
UV-rays	$10^{-9} - 4 \times 10^{-7}$
Microwave	$10^{-4} - 10^{0}$

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

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

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

18 **(a)**

Using the relation

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

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

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

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