

- Q.1** Match List-I (Electromagnetic wave type) with List-II (Its association/application) and select the correct option from the choices given below the lists

List - I	List - II
(P) Infrared waves	(i) To treat muscular Strain
(Q) Radio waves	(ii) For broadcasting
(R) X- rays	(iii) To detect fracture of bones
(S) Ultraviolet rays	(iv) Absorbed by the ozone layer of the atmosphere

(A)

P	Q	R	S
i	ii	iii	iv

(B)

P	Q	R	S
i	ii	iv	iii

(C)

P	Q	R	S
i	iii	ii	iv

(D)

P	Q	R	S
iii	ii	i	iv

- Q.2** An electromagnetic wave going through vacuum is described by  $\mathbf{E} = \mathbf{E}_0 \sin(\mathbf{kx} - \omega t)$ . Which of the following is/are independent of the wavelength?

(A)  $k$                       (B)  $\omega$                       (C)  $\frac{k}{\omega}$                       (D)  $k\omega$

- Q.3** The energy of an electromagnetic wave is of the order **15 keV**. To which part of the spectrum does it belong?

(A) Ultraviolet rays      (B)  $\gamma$ -rays                      (C) X rays                      (D) Infrasonic rays

- Q.4** If  $\lambda_v, \lambda_x$  and  $\lambda_m$  represent the wavelengths of visible light, X – rays and microwaves respectively, then-

(A)  $\lambda_m > \lambda_x > \lambda_v$       (B)  $\lambda_m > \lambda_v > \lambda_x$       (C)  $\lambda_v > \lambda_x > \lambda_m$       (D)  $\lambda_v > \lambda_m > \lambda_x$

- Q.5** Light with energy flux of **18 W/cm<sup>2</sup>** falls on a non-reflecting surface, of area **20 cm<sup>2</sup>**, at normal incidence. The momentum delivered in **30 minute** is -

(A)  $1.08 \times 10^{-5} \text{ kg} - \text{ms}^{-1}$                       (B)  $2.16 \times 10^{-3} \text{ kg} - \text{ms}^{-1}$   
 (C)  $1.08 \times 10^{-3} \text{ kg} - \text{ms}^{-1}$                       (D)  $2.16 \times 10^{-5} \text{ kg} - \text{ms}^{-1}$

- Q.6** The condition under which a microwave oven heats up a food item containing water molecules most efficiently is -

(A) Frequency of the microwaves  $\geq$  resonant frequency of the water molecules.  
 (B) Frequency of the microwaves  $<$  Resonant frequency of the water molecules  
 (C) Frequency of the microwaves = Resonant frequency of the water molecules  
 (D) Frequency of the microwaves  $>$  Resonant frequency of the water molecules

- Q.7** A plane electromagnetic wave has an intensity of  $6 \frac{\text{W}}{\text{m}^2}$  strikes a small pocket mirror which has an area  $40 \text{ cm}^2$  held perpendicular to the approaching wave. Then, what momentum does the wave transfer to the mirror each second?
- (A)  $1.6 \times 10^{-11} \frac{\text{kg m}}{\text{s}^2}$       (B)  $1.6 \times 10^{-10} \frac{\text{kg m}}{\text{s}^2}$       (C)  $1.6 \times 10^{-9} \frac{\text{kg m}}{\text{s}^2}$       (D)  $1.6 \times 10^{-8} \frac{\text{kg m}}{\text{s}^2}$
- Q.8** Which one of the following rays cannot travel in vacuum?
- (A) Gamma rays      (B) X rays      (C) UV rays      (D) Infrasonic rays
- Q.9** Under which condition a food item which contains water molecules heats up efficiently?
- (A) Microwaves are meant for heating.  
(B) Infrared waves are used in microwave oven.  
(C) The frequency of the microwave matches the resonant frequency of the water molecules.  
(D) There is no relation between the frequency of a microwave and the resonant frequency of the water molecules.
- Q.10** Why X-rays are used in determining molecular structure of crystals?
- (A) Because of their high energy  
(B) Their frequency is low  
(C) The penetration power is high  
(D) The wavelength of X-rays matches with the interatomic space

**ANSWER KEY**

<b>Q.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Sol.</b>	(A)	(C)	(C)	(B)	(B)	(C)	(B)	(D)	(C)	(D)