9.ELECTROMAGNETIC RADIATIONS

Teaching Task

1. Which of the following statements is not correct regarding electromagnetic spectrum?
   A) The velocity of X-rays is more than that of microwaves
   B) Infra-red radiations have larger wavelength than cosmic rays
   C) The frequency of microwaves is less than that of ultra - violet rays
   D) X-rays have larger wave number than micro waves

Answer:A

Solution:

Let's check each statement:

A) The velocity of X-rays is more than that of microwaves

Incorrect. All electromagnetic waves travel at the same speed c in vacuum.

B) Infra-red radiations have larger wavelength than cosmic rays

Correct. Cosmic rays are high-energy particles, but cosmic gamma rays have very small wavelength; IR has much larger wavelength.

C) The frequency of microwaves is less than that of ultra-violet rays

Correct. Microwaves have lower frequency than UV.

D) X-rays have larger wave number than micro waves

Correct. Wave number $k = \frac{1}{\lambda}$; X-rays have smaller λ , so larger wave number.

2. Which type of radiation is not emitted by the electronic structure of atoms :
   A) Ultraviolet light B) X-rays C) Visible light D) g-rays

Answer:D

Solution:

Electronic transitions in atoms produce UV, visible, and sometimes X-rays.

Gamma rays (γ -rays) originate from nuclear transitions, not electronic transitions

3. The increasing order of energy of electromagnetic radiation can be represented as **(FA & SA- 2 Marks)**
   A) microwave < infrared < visible < X-ray
   B) X-ray < visible < infrared < microwave
   C) microwave < infrared < visible < radiowaves
   D) X-ray < infrared < visible < microwave

Answer:A

Solution:Increasing order of energy of electromagnetic radiation is microwave < infrared < visible < X-ray

Explanation:Energy of EM radiation is proportional to frequency: $E = h\upsilon$

Frequency order (low $\rightarrow$ high): Microwave < Infrared < Visible < X-ray

Hence, energy increases in the same order

4. If λ_1 and λ_2 are the wavelength of characteristic X-rays and gamma rays respectively, then the relation between them is

A) $\lambda_1 = \frac{1}{\lambda_2}$ B) $\lambda_1 = \lambda_2$ C) $\lambda_1 > \lambda_2$ D) $\lambda_1 < \lambda_2$

Answer:C

Solution:X-rays have longer wavelengths than γ-rays (higher energy = shorter).

5. Neon gas emits at 616 nm. The distance travelled by this radiaton in 30 sec is. **(FA & SA- 5 Marks/8 Marks)**

A) $9\times10^7 m$ B) $9\times10^9 m$ C) $4.5\times10^9 m$ D) $7\times10^9 m$

Answer:B

Solution: Wavelength $\lambda = 616 nm$ but this is irrelevant because all electromagnetic radiation travels at the speed of light in vacuum

$c = 3\times10^8 m/s$

Distance travelled in $t = 30s$

$$\text{Distance} = c\times t = (3\times10^8 \text{ m/s})\times(30\text{s})$$

$$\text{Distance} = 9\times10^9 \text{ m} = 9 \text{ billion meters} = 9\times10^6 \text{ km}$$

$$\text{Numerically}: 9,000,000,000\, m (or) 9\times10^9\, m$$

6. Which of the following statement is true

A) γ – rays, cosmic rays, cathode rays are electromagnetic radiation

B) All electromagnetic radiations travel with different velocities.

C) Electromagnetic waves do not require any medium and can travel in vaccum

D) All are correct

Answer:C

Solution:

A) Gamma rays, cosmic rays, cathode rays are electromagnetic radiation

False — cathode rays are electrons (not EM radiation).

B) All electromagnetic radiations travel with different velocities

False — in vacuum, all EM waves travel at speed c.

C) Electromagnetic waves do not require any medium and can travel in vacuum → True.

7. Which of the following statements are not correct about frequency

A) Distance travelled by one wave in one second = hv

B) Relation between Frequency and Wavelength = $\nu \ \alpha \ \frac{1}{\lambda}$

C) Expressed in terms of cycles (or waves) per second (cps) or hertz (Hz) or cm^{-1}

D) number of waves which pass through a point in one second

Answer:A

Solution:Distance travelled in one second = wavelength (λ), not $h\upsilon$.

8. Electromagnetic radiation, which of the following has greater wavelength than visible light **(FA & SA- 3Marks/4Marks)**
   A) U.V rays B) I.R rays C) Gamma rays D) X-rays

Answer:B

Solution:Visible light wavelength range: 400–700 nm
Infrared (IR) rays: >700 nm $\rightarrow$ longer wavelength than visible light
Other options:
UV rays: shorter wavelength than visible light (<400 nm)
X-rays: much shorter wavelength (~0.01–10 nm)
Gamma rays: even shorter wavelength (~10^{-12} m)

9. Which of the following statement is incorrect
   i) The height of crest or depth of trough is called the wavelength
   ii) Amplitude determines the intensity of the radiation.
   iii) Wave number is the number of wave lengths per meter
   A) only iii B) ii and iii C) i and iii D) only i

Answer:D

Solution:The height of crest/depth of trough is called the amplitude (not wavelength).

10. Which of the following relation is correct
    A) $1cm = 10^8\,\mathring{A} = 10^4\,\mu = 10^7\,nm$ B) $1\mathring{A} = 10^{-8}\,cm = 10^{-10}\,m$
    C) $1\mu = 10^{-4}\,cm = 10^{-6}\,m$ D) All are correct

Answer:D

Solution:1 cm = 10^{-2} m
1 Å (angstrom) = 10^{-10} m = 10^{-8} cm
1 μm (micrometer) = 10^{-6} m = 10^{-4} cm
1 nm (nanometer) = 10^{-9} m = 10^{-7} cm
1 μm = 10^3 nm

MULTIPLE CORRECT ANSWER TYPE

11. The incorrect relation (s) about the velocity of charged particle in electromagnetic radiation is (are)
    A) dependent on its wavelength
    B) Depend on its intensity C) equal to cube of its ampliture
    D) independent of its wavelength

Answer:A,B,C

Solution:The velocity of electromagnetic radiation (light) is constant (c=3×10^8m/s) in a vacuum and does not depend on:Wavelength ,Intensity,Amplitude.

12. In a hydrogen like sample two different types of photons A and B are produced by electronic transition. Photon B has it's wavelength in infrared region if photon A has more energy than B, then the photon A may belong to the region.
    A) ultraviolet B) visible C) infrared D) None of these

Answer:A,B,C

Solution:If photon A has more energy than photon B , then λ of photon A must be less then λ of photon B. If λ of photon B is in IR region, λ of photon A be in Infrared region or visible region or ultra violet region.

STATEMENT TYPE

A) Both statement I and II are correct and statement II is correct explanation of statement I.

B) Both statement I and II are correct and statement II is not correct explanation of statement I.

C) Statement I is correct and statement II is incorrect.

D) Statement I is incorrect and statement II is correct.

13 Statement I : The energy of ultraviolet radiation is greater than the energy of infrared radiation

Statement II : The velocity of ultraviolet radiation is greater than the velocity of infrared radiation.

Answer:C

Solution:Statement I is correct: UV radiation has higher energy than IR because $E=h\upsilon$ (energy α frequency), and UV has a higher frequency.

Statement II is incorrect: All electromagnetic waves (UV, IR, etc.) travel at the same speed

14 Statement I : VIBGYOR signifies the seven colour of visible light.

Statement II: Red colour corresponds to higher frequency and blue colour to lower frequency region.

Answer:C

Solution:Statement I is correct: VIBGYOR (Violet, Indigo, Blue, Green, Yellow, Orange, Red) represents the visible spectrum.

Statement II is incorrect:

Red has the lowest frequency (and longest wavelength).

Violet/Blue has the highest frequency (and shortest wavelength).

COMPREHENSION TYPE

COMPREHENSION-I

The frequency (ν), wavelength (λ) and velocity of light (c) are related by the equations $c = \nu\lambda$. The other commonly used quantity specially in spectroscopy is the wavenumber ($\bar{\nu}$).

15. Which of the following relations are correct?

A) Frequency × wavelength = Velocity of light B) $\bar{\nu} = \frac{1}{\lambda}$

C) $\lambda = \frac{c}{\nu}$ D) All of these

Answer:D

Solution:all options A, B, and C are correct,

16. The wave number of a radiation is 97540 cm^{-1}. Calculate its frequency.

A) $2.926 \times 10^{10}s^{-1}$ B) $2.926 \times 10^{15}s^{-1}$ 3C) $2.926 \times 10^{2}s^{-1}$ D) $2.926 \times 10^{20}s^{-1}$

Answer:B

Solution:Convert wave number to wavelength

$$\lambda = \frac{1}{\bar{\upsilon}} = \frac{1}{97540 cm^{-1}} = 1.025\times10^{-5} cm = 1.025\times10^{-7} m$$

Calculate frequency : $\upsilon = \frac{c}{\lambda} = \frac{3\times10^{8} m/s}{1.025\times10^{-7} m} = 2.926\times10^{15} s^{-1}$

COMPREHENSION-II

Light and other forms of radiant energy propagate without any medium in the space in the form of waves are known as *electromagnetic radiations*. These waves can be produced by a charged body moving in a magnetic field or a magnet in a electric field. e.g. γ – rays, cosmic rays, ordinary light rays etc.The arrangement of different electromagnetic radiations in the order of increasing wavelength or frequency is known as electromagnetic spectrum.

17. Which of the following is the correct Arrangement of the radiations in increasing order of wavelength
    A) X-ray < infrared < visible < microwave
    B) Microwave < Visibe < γ – rays < X-rays
    C) X-rays < γ – rays < Radio waves < Microwave
    D) γ – rays < infrared < Microwave < Radio waves

Answer:D

Solution:Standard Wavelength Order (increasing):Gamma rays < X-rays < Ultraviolet < Visible < Infrared < Microwaves < Radio waves

INTEGER TYPE

18. The frequency of a radiation having a wave number of $2\times10^{14} cm^{-1}$ will be $x\times10^{24} s^{-1}$. Then the value of x is _____

Answer:6

Solution: $\upsilon = c\bar{\upsilon} = (3\times10^{10})(2\times10^{14}) = 6\times10^{24} s^{-1}$

x=6

19. Distance travelled by a wave in 10 sec. is 50m. If frequency of wave is 2 KHz then its wave length is____X 10^{-2}

Answer:25

Solution:

$$Velocity = \frac{Distance}{Time} = \frac{50}{10} = 5m/s$$

$$\lambda = \frac{velocity}{\upsilon} = \frac{5m/s}{2000Hz} = 2.5\times10^{-3} m = 25\times10^{-2} cm$$

20. 1 nano meter is _____ A^0

Answer:10

Solution:

$1nm = 10^{-9} m$

$1A^0 = 10^{-10} m$

$1nm = \frac{10^{-9} m}{10^{-10} m} = 10A^0$

21. 1 micro meter is = 1×10^{x} picometers, then the value of "x" is

Answer:6

Solution:

$1\mu m = 10^{-6} m$

$1pm = 10^{-12} m$

$1\mu m = \frac{10^{-6} m}{10^{-12} m / pm} = 10^{6} pm$

MATRIX MATCHING TYPE

22.

	List - I	List - II
A)	Ratio of Velocity of light and Frequency	1) Velocity of light
B)	Product of Frequency and wavelength	2) Wave number
C)	Ratio of Velocity of light and Wavelength	3) Wavelength
D)	Ratio of Frequency and Velocity of light	4) Frequency

The correct match is

	A	B	C	D		A	B	C	D
A)	3	2	1	4	B)	3	1	2	4
C)	2	4	1	3	D)	3	1	4	2

Answer:D

Solution:

A)	Ratio of Velocity of light and Frequency	3) Wavelength
B)	Product of Frequency and wavelength	1) Velocity of light
C)	Ratio of Velocity of light and Wavelength	4) Frequency
D)	Ratio of Frequency and Velocity of light	2) Wave number

A) $\frac{c}{\nu} = \lambda \rightarrow$ Wavelength (3)

B) $\nu \times \lambda = c \rightarrow$ Velocity of light (1)

C) $\frac{c}{\lambda} = \nu \rightarrow$ Frequency (4)

D) $\frac{\nu}{c} = \frac{1}{\lambda} \rightarrow$ Wave number (2)

Learners Task

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. All types of electromagnetic radiations possess same

A) Wave length B) Frequency

C)Energy D) Velocity when they passed through vacuum

Answer:D

Solution:All EM waves travel at speed of light (c ˜ 3 × 10^8 m/s) in vacuum, regardless of wavelength or frequency

2. The radiation with highest wave number

A) Micro waves B) X–rays C) I.R.Radiations D) Radiowaves

Answer:B

Solution:Wave number $\bar{\upsilon} = \frac{1}{\lambda}$

Shorter wavelength $\rightarrow$higher wave number

X-rays have much shorter wavelength than microwaves, IR, and radio waves $\rightarrow$ highest wave number.

3. The electromagnetic radiations are,

a) Visible light B) IR light C) UV light D) Micro waves

The correct order of increasing energy from lowest to highest is

A) $a > b > c > d$ B) $a < b < c < d$ C) $d < b < a < c$ D) $b < c < d < a$

Answer:C

Solution:

The correct order of increasing energy for the given electromagnetic radiations is:
Microwaves < IR light < Visible light < UV light
So from lowest to highest:
D) Microwaves <B) IR light < A) Visible light < C) UV light

4. Identify the incorrectly matched set from the following

list I	**list II**
A) Wavelength	Nanometers
B) Frequency	Hertz
C) Wavenumber	m^{-1}
D) Velocity	ergs

Answer:D

Solution:Velocity is measured in m/s (not ergs, which is a unit of energy).

5. The product of which of the following is equal to the velocity of light

A) Wave length and wave number B) Wave length and frequency
C) Frequency and wave number D) Wave length and amplitude

Answer:B

Solution:The velocity of light (c) is related to wavelength (λ) and frequency (υ) by the formula:$c = \lambda \cdot \upsilon$

Where:c = speed of light

λ = wavelength

υ = frequency

6. The frequency of a wave light is $\mathbf{1.0 \times 10^6}$ sec^{-1}. The wave length for this wave is

A) 3×10^4 cm B) 3×10^{-4} cm C) 6×10^4 cm D) 6×10^6 cm

Answer:A

Solution: $\lambda = \frac{c}{\upsilon}$

$\lambda = \frac{3\times10^{10}}{10^{6}} = 3\times10^{4}$

7. If the wavelength of green light is about $5000A^{0}$, then the frequency of its wave is

A) $16\times10^{14}\ \text{sec}^{-1}$ B) $16\times10^{-14}\ \text{sec}^{-1}$ C) $6\times10^{14}\ \text{sec}^{-1}$ D) $6\times10^{-14}\ \text{sec}^{-1}$

Answer:C

Solution: $\lambda = 5000A^{0} = 5000\times10^{-10}m = 5\times10^{-7}m$

$\upsilon = \frac{c}{\lambda} = \frac{3\times10^{8}m/s}{5\times10^{-7}m} = 6\times10^{14}s^{-1}$

8. Which of the following properties of a wave is independent of the other?

A) Wave number B) Wave length C) Frequency D) Amplitude

Answer:D

Solution: The amplitude of a wave is independent of wavelength, frequency, and wave number.

9. The wave length of light having wave number 4000 cm^{-1} is

A) 2.5μm B) 250μm C) 25μm D) 25nm

Answer:A

Solution:Given Wave number $\bar{\upsilon} = 4000cm^{-1}$

The wavelength λ is: $\lambda = \frac{1}{\bar{\upsilon}} = \frac{1}{4000cm^{-1}} = 0.00025cm$

Convert to micrometers (1 cm=10^{4} μm):

$0.00025\,\text{cm} = 0.00025\times10^{4}\ \mu\text{m} = 2.5\,\mu\text{m}$

10. Which of the following is not an electromagnetic radiation?

A) Gamma rays B) Alpha rays C) Radio waves D) X-rays

Answer:B

Solution:Alpha rays are helium nuclei (particles), not EM waves.
Others (gamma, radio, X-rays) are EM radiations.

JEE MAIN LEVEL QUESTIONS

1. Calculate the wave-number of lines having the frequency of 5 × 10^{16} cycles per sec. **(FA & SA- 5 Marks/8 Marks)**

A) 1.666 × 10^{8} m^{-1} B) 0.666 × 10^{8} m^{-1}
C) 4.126 × 10^{6} m^{-1} D) 3.133 × 10^{4} m^{-1}

Answer:A

Solution:Frequency(υ) 5 × 10^{16}
Speed of light c=3×10^{8} m/s
Find wavelength

$\bar{\upsilon} = 4000\,cm^{-1}$

$\lambda = \frac{c}{\upsilon} = \frac{3\times10^{8}}{5\times10^{16}} = 6\times10^{-9}\,m$

Step 2: Wave number $\bar{\upsilon}(m^{-1})$

$\bar{\upsilon} = \frac{1}{\lambda} = \frac{1}{6\times10^{-9}} = 1.666\times10^{8}\ m^{-1}$

2. The frequency of line spectrum of sodium is 5.09×10^{14} sec^{-1}. Its wave length (in nm) will be – [c = 3×10^{8} m/sec]

A) 510 nm B) 420 nm C) 589 nm D) 622 nm

Answer:C

Solution:

$Frequency(\upsilon) = 5.09\times10^{14}\ s^{-1}$

$c = 3\times10^{8}\ m/s$

$\lambda = \frac{c}{\upsilon} = \frac{3\times10^{8}}{5.09\times10^{14}} = 5.894\times10^{-7}\ m$

Convert to nm

$1nm = 10^{-9}\ m$

$\lambda \approx 589.4nm$

3. Frequency ratio between violet (400 nm) and red (750 nm) radiations in the visible spectrum, is-

A) 8/15 B) 4/15 C) 15/8 D) None of these

Answer:C

Solution: $\lambda = \frac{c}{\upsilon}$

$\frac{\upsilon_{violet}}{\upsilon_{red}} = \frac{\lambda_{red}}{\lambda_{violet}} = \frac{750nm}{400nm} = \frac{15}{8}$

4. The time period of a light is $2.0\times10^{-10}s$. The wavelength for this wave is

(FA & SA- 3Marks/4 Marks)

A) 0.06m B) 6m C) 0.03m D) 0.3m

Answer:A

Solution:Time period T=2.0 x 10^{-10}s

Speed of light c=3×10 ^{8} m/s

Use the relation

$\lambda = c \times T$

$\lambda = (3 \times 10^{8}) \times (2.0 \times 10^{-10})$

$\lambda = 6 \times 10^{-2} = 0.06m$

5. The wavelengths of two radiations are 200 & 300nm respectively. Then identify the correct statement

LIST - A	LIST - B
I) Ratio of their frequency	a) 1 : 1
II) Ratio of their velocity	b) 3 : 2
III) Ratio of their wave number	c) 2 : 9

A) I– c, II– a, III – b B) I – b, II – a, III – b

C) I – b, II – a, IIII – c D) I – b, II – a, III – a

Answer:B

Solution:I) Ratio of their frequency

$$\frac{\upsilon_1}{\upsilon_2} = \frac{\lambda_2}{\lambda_1} = \frac{300nm}{200nm} = \frac{3}{2}$$

II)Velocity ratio (II):All EM waves have the same velocity (c) in vacuum =1:1

III) Ratio of their wave number

$$\frac{\bar{\upsilon}_1}{\bar{\upsilon}_2} = \frac{\lambda_2}{\lambda_1} = \frac{300nm}{200nm} = \frac{3}{2}$$

6 Which of the following properties of a wave is independent of the other?

(FA & SA- 2 Marks)

A) Wave number B) Wave length C) Frequency D) Amplitude

Answer:D

Solution: The amplitude of a wave is independent of wavelength, frequency, and wave number.

7. Human eye can detect only the radiations which fall in the visible region. Which of the following statement is/are correct about visible spectrum?

a) It consists of White light only b) Violet radiation have longer frequency

c) Red radiation have longer wavelength d) Violet radiation have shorter wavelength

A) Only a is correct B) Only a,b statements are correct

C) b,c,d are correct D) a,b,c,d are correct

Answer:C

Solution:a) Incorrect: Visible light consists of VIBGYOR (violet to red), not just white light (which is a mixture of all colors).

b) Correct: Violet has the highest frequency (and shortest wavelength) in the visible spectrum.

c) Correct: Red has the longest wavelength (and lowest frequency).
d) Correct: Violet has the shortest wavelength (as stated in b).

8. Which of the following is the correct match with Electromagnetic spectrum, frequency,wavelength and Source

A. Visible - Frequency - 1 x 10^5 -1 x 10^9 - Electric bulbs, sun rays

B. *X*-Rays - Wavelength in A^0 - $150-0.1$ - radioactive decay

C. γ – Rays - Frequency - $3\times10^{19}-3\times10^{20}$ - radioactive decay

D. Infrared (IR) - Wavelength in A^0- 6 x 10^6 - 7600- Incandescent objects

Answer:C,D

Solution:

C) γ – Rays - Frequency - $3\times10^{19}-3\times10^{20}$ (correct range for gamma rays)
Source: Radioactive decay $\rightarrow$(true — emitted from atomic nuclei)
D) Infrared (IR)
Wavelength in A^0- 6 x 10^6 - 7600 (correct IR range)
Source: Incandescent objects $\rightarrow$ (correct source)

ADVANCED LEVEL QUESTIONS

MULTIPLE CORRECT ANSWER TYPE

9. Which of the following relates to light as wave motion

A) Diffraction B) Interference C) Photo electric effect D) $E = mc^2$

Answer:A,B

Solution:

Diffraction and interference are phenomena that demonstrate the wave-like nature of light, where waves bend around obstacles or overlap to create specific patterns.

10. Electromagnetic radiatiations of frequency 'v' consists of a stream of particles called photons. Which of the following statements is / are true about photons :

A) as the frequency increases, the number of photons in the beam increases.
B) as the intensity of light increases ' the number of photons in the beam increases.
C) the number of photons in the beam are independent of frequency
D) the number of photons in the beam are independent of the intensity of light.

Answer:B,C

Solution:

Energy per photon: $E=h\upsilon$ (depends on frequency).
Intensity: Total energy = Number of photons × Energy per photon.
Higher intensity $\rightarrow$ More photons (B is correct).
Number of photons does not depend on frequency

JEE ADVANCED LEVEL

STATEMENT TYPE

A) Both statement I and II are correct and statement II is correct explanation of statement I.

B) Both statement I and II are correct and statement II is not correct explanation of statement I.

C) Statement I is correct and statement II is incorrect.

D) Statement I is incorrect and statement II is correct.

11. **Statement I**: Electromagnetic radiations around 10^{15} Hz are called as visible light.
Statement II: This is the only part of electromagnetic radiation which is visible to eyes.

Answer:A

Solution:The range of electromagnetic frequencies around 10^{15} Hz corresponds to visible light.Visible light is indeed the only part of the EM spectrum detectable by the human eye.

COMPREHENSION TYPE

COMPREHENSION-I

The frequency (ν), wavelength (λ) and velocity of light (c) are related by the equations $c = \nu\lambda$. The other commonly used quantity specially in spectroscopy is the wavenumber ($\bar{\nu}$).

12. Light or any electro magnetic radiation travels in vaccum or air with a speed of :
A) 3×10^8 m/s B) 3×10^2 m/s C) 2×10^8 m/s D) 1×10^8 m/s

Answer:A

Solution:Light or any electro magnetic radiation travels in vaccum or air with a speed of 3×10^8 m/s

COMPREHENSION-II

Light and other forms of radiant energy propagate without any medium in the space in the form of waves are known as *electromagnetic radiations*. These waves can be produced by a charged body moving in a magnetic field or a magnet in a electric field. e.g. $\gamma-$rays, cosmic rays, ordinary light rays etc.The arrangement of different electromagnetic radiations in the order of increasing wavelength or frequency is known as electromagnetic spectrum.

13. Which of the following statement is correct
A) Lamps with mercury vapours produces IR rays
B) Radio waves are produced from alternate current of low frequency
C) X- rays are produced by striking metal plate with Alpha rays D) All are incorrect

Answer:B

Solution: Radio waves are produced by low-frequency alternating currents (typically in antennas). These are usually frequencies from a few kHz up to GHz range.

14. If the wavelength of X-Rays is $2\times10^{-14}cm$, then wave length of Infrared rays is equal to

A) $5\times10^{-12}cm$ B) $8\times10^{-15}cm$ C) $15\times10^{-18}cm$ D) $25\times10^{-18}cm$

Answer:A

Solution:Infrared rays have much longer wavelengths than X-rays.

So, the wavelength of infrared must be much larger than $2\times10^{-14}cm$

$5\times10^{-12}cm \quad > 2\times10^{-14}cm$

INTEGER TYPE

15. If the Radiowave is having a frequency of 6000 Hz and Microwave of frequency 2000 Hz, then how many times the frequency of Microwaves is greater than frequency of Radiwave

Answer:3

Solution: $\text{Ratio} = \frac{f_{\text{radio}}}{f_{\text{micro}}} = \frac{6000}{2000} = 3$

MATRIX MATCHING TYPE

16. List - I **List - II**

I) Wave number a) ms^{-1}

II) Frequency b) nm

III) Wavelength c) s^{-1}

IV) Velocity d) m^{-1}

The correct match is

	I	**II**	**III**	**IV**		**I**	**II**	**III**	**IV**
A)	a	b	c	d	B)	d	c	b	a
C)	b	c	d	a	D)	c	d	b	a

Answer:B

Solution:

I) Wave number d) m^{-1}

II) Frequency c) s^{-1}

III) Wavelength b) nm

IV) Velocity a) ms^{-1}

KEY

				Teaching Task					
1	2	3	4	5	6	7	8	9	10
A	D	A	C	B	C	A	B	D	D
11	12	13	14	15	16	17	18	19	20
A,B,C	A,B,C	C	C	D	B	D	6	25	10
21	22								
6	D								
				Learners Task					
			CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)						
1	2	3	4	5	6	7	8	9	10
D	B	C	D	B	A	C	D	A	B
				JEE MAIN LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
A	C	C	A	B	D	C	C,D	A,B	B,C
				JEE ADVANCED LEVEL					
11	12	13	14	15	16				
A	A	B	A	3	B				