1.

Electromagnetic waves are produced by

1. A static charge
2. A moving charge
3. An accelerated charge
4. Charges particles

2.

The idea of displacement current was introduced by

1. Maxwell
2. Hertz
3. Marconi
4. Bose

3.

The direction of propagation of electromagnetic wave is same as that of (Here $\vec{E}=$ electric field vector and $\vec{B}=$ magnetic field vector)

1. $\vec{E}\times\vec{B}$
2. $\vec{B}\times\vec{E}$
3. $\vec{E}$
4. $\vec{B}$

4.

In a E.M.W., phase difference between $\vec{E}$ and $\vec{B}$ is :

1. zero
2. $\pi/2$
3. π
4. $\pi/3$

5.

A black body has maximum radiation intensity at wavelength λ_m at 2000 K. Its corresponding wavelength at 3000 K will be

1. $\frac{16}{81}\lambda_m$
2. $\frac{81}{16}\lambda_m$
3. $\frac{3}{2}\lambda_m$
4. $\frac{2}{3}\lambda_m$

6.

An electromagnetic radiation has an energy of 13.2 keV. Then, the radiation belongs to the region of

1. visible light
2. ultraviolet
2. infrared
4. X-ray

i.e., spectrum lies in the X-ray region

7.

A black body has maximum radiation intensity at wavelength λ_m at 2000 K. Its corresponding wavelength at 3000 K will be

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8.

In an electromagnetic wave in free space the root mean square value of the electric field is $E_{rms}=6$ V/m. The peak value of the magnetic field is

(a) $1.41\times10^{-8}T$

(b) $2.83\times10^{-8}T$

(c) $0.70\times10^{-8}T$

(d) $4.23\times10^{-8}\,T$

9.

Out of the following options which one can be used to produce a propagating electromagnetic wave?

(a) A stationary charge

(b) A chargeless particle

(c) An accelerating charge

(d) A charge moving at constant velocity

10.

The energy of the EM wave is of the order of 15 KeV. To which part of the spectrum does it belong?

(a)X-rays

(b)Infrared rays

(c)Ultraviolet rays

(d)γ-rays

11.

The condition under which a microwave oven heats up a food item containing water molecules most efficiently in

(a) the frequency of the microwave must match the resonant frequency of the water molecules

(b) the frequency of the microwave has no relation with natural frequency of water molecules

(c) microwave are heat waves, so always produce heating

(d) infrared waves produce heating in a microwave oven

12.

The electric field associated with an electro magnetic wave in vacuum is given by E= 40cos

$\left(kz - 6 \times 10^8 t\right)$,where E,z and t are in volt/m, metre and second respectively.The value of wave vector k is

(a) $2\ m^{-1}$ (b) $0.5\ m^{-1}$

(c) $6\ m^{-1}$ (d) $3\ m^{-1}$

13.

The electric and the magnectic field, associated with an electromagnetic wave, propagating along the +z-axis, can be represented by

(a) $\left[\mathrm{E} = \mathrm{E}_0\hat{\mathrm{k}},\ \mathrm{B} = \mathrm{B}_0\hat{\mathrm{i}}\right]$ (b) $\left[\mathrm{E} = \mathrm{E}_0\hat{\mathrm{j}},\ \mathrm{B} = \mathrm{B}_0\hat{\mathrm{j}}\right]$

(c) $\left[\mathrm{E} = \mathrm{E}_0\hat{\mathrm{j}},\ \mathrm{B} = \mathrm{B}_0\hat{\mathrm{k}}\right]$ (d) $\left[\mathrm{E} = \mathrm{E}_0\hat{\mathrm{i}},\ \mathrm{B} = \mathrm{B}_\mathrm{o}\hat{\mathrm{j}}\right]$

14.

Which of the following statement is false for the properties of electromagnetic waves?

(a)Both electric and magnetic field vectors attain the maxima and minima at the same place and same time

(b)The energy in electromagnetic wave is divided equally between electric and magnetic vectors

(c)Both electric and magnetic field vectors are parallel to each other and perpendicular to the direction of propagation of wave

(d)These waves do not require any material medium for propagation

15.

The electric field of an electromagnetic wave in free space is given by $\vec{\mathbf{E}} = 10\ \cos\left(10^7 t + kx\right)\hat{\mathbf{j}}\ \mathrm{V/m}$, where *t* and *x* are in seconds and metres respectively. It can be inferred that

(1) The wavelength λ is 188.4 m.

(2) The wave number *k* is 0.33 rad/m.

(3) The wave amplitude is 10 V/m.

(4) The wave is propagating along +*x* direction

Which one of the following pairs of statement is correct ?

(a) (3) and (4) (b) (1) and (2)

(c) (2) and (3) (d) (1) and (3)

16.

The electric field part of an electromagnetic wave in a medium is represented by

$\mathrm{E_x} = 0;$

$\mathrm{E_y} = 2.5\frac{\mathrm{N}}{\mathrm{C}}\cos\left[\left(2\pi \times 10^6\ \frac{\mathrm{rad}}{s}\right)\mathrm{t} - \left(\pi \times 10^{-2}\ \frac{\mathrm{rad}}{m}\right)\mathrm{x}\right]$

$\mathrm{E_z} = 0.$ The wave is

(a) moving along y-direction with frequency $2\pi \times 10^6$ Hz and wavelength 200 m.

(b) moving along x-direction with frequency 10^6 Hz and wavelength 100 m

(c) moving along x-direction with frequency 10^6 Hz and wavelength 200 m

(d) moving along x-direction with frequency 10^6 Hz and wavelength 200 nm

17.

The velocity of electromagnetic radiation in a medium of permittivity ε_0 and permeability μ_0 is given by

(a) $\sqrt{\frac{\varepsilon_o}{\mu_o}}$

(b) $\sqrt{\mu_o \varepsilon_o}$

(c) $\frac{1}{\sqrt{\mu_o \varepsilon_o}}$

(d) $\sqrt{\frac{\mu_o}{\varepsilon_o}}$

18.

If λ_v, λ_x and λ_m represent the wavelengths of visible light, x-rays and microwaves respectively, then-

1. $\lambda_\mathrm{m} > \lambda_\mathrm{x} > \lambda_\mathrm{v}$
2. $\lambda_\mathrm{v} > \lambda_\mathrm{m} > \lambda_\mathrm{x}$
3. $\lambda_\mathrm{v} > \lambda_\mathrm{x} > \lambda_\mathrm{m}$
4. $\lambda_\mathrm{m} > \lambda_\mathrm{v} > \lambda_\mathrm{x}$

19.

If threshold wavelength for a photosensitive plate is 4000 Å, what will be the value of saturation current if radiation of wavelength 5000 Å is incident?

1. Zero.
2. 1 mA.
3. 3 mA.
4. Data is insufficient to predict.

20.

The de Broglie wavelength of α-particle is λ and that of proton is λ'. If the two particles are accelerated through same potential , the ratio $\frac{\lambda}{\lambda'}$ will be

1. $1 : 2\sqrt{2}$
2. $1 : 2$
3. $1 : 4$
4. $1 : 1$

21.

If potential energy in first excited state in H-atom is taken to be

zero then kinetic energy in this orbit will be

1. 3.4 eV
2. 6.8 eV
3. 10.2 eV
4. 13.6 eV

22.

The displacement current flows in the dielectric of a capacitor when the potential difference between its plates:-

1. is changing with time.
2. is changing with distance.
3. becomes zero.
4. has assumed a constant value.

23.

For an electromagnetic wave the electric and magnetic field vectors are along +y and +z directions respectively. Then the propagation of the EM wave should be along:-

1. +y-direction
2. -y-direction
3. +x-direction
4. +z-direction

24.

The wavelength of light of frequency 100 Hz is

1. 2 x 10^6m
2. 3 x 10^6m
3. 4 x 10^6m
4. 5 x 10^6m

25.

The frequency of y-rays, X-rays and ultraviolet rays are a, b, and c respectively. Then

1. a > b > c
2. a < b < c
3. a = b = c
4. a > c > b

26.

The ozone in the atmosphere is useful because it

1. stops ultraviolet radiation.
2. absorbs pollutant gases.
3. stops the greenhouse effect.
4. stops the increase in temperature of the atmosphere.

27.

Which is having a minimum wavelength?

1. X-rays
2. Ultraviolet rays
3. y-rays
4. Cosmic rays

28.

What is the cause of the 'greenhouse effect'?

1. Infrared rays
2. Ultraviolet rays
3. X-rays
4. Radio waves

29.

The velocity of the electromagnetic wave is parallel to

1. $\vec{B} \times \vec{E}$
2. $\vec{E} \times \vec{B}$
3. $\vec{E}$
4. $\vec{B}$

30.

We consider the radiation emitted by the human body. Which of the following statements is true?

1. The radiation emitted is in the infrared region.
2. The radiation is emitted only during the day.
3. The radiation is emitted during the summers and absorbed during the winters.
4. The radiation emitted lies in the ultraviolet region and hence is not visible.

31.

Which of the following rays are not electromagnetic waves?

1. X-rays
2. y-rays
3. β-rays
4. Heats rays

32.

If λ_v, λ_x and λ_m represent the wavelength of visible light, X-rays, and microwaves respectively, then

1. $\lambda_m > \lambda_x > \lambda_v$
2. $\lambda_v > \lambda_m > \lambda_x$
3. $\lambda_v > \lambda_x > \lambda_m$
4. $\lambda_m > \lambda_v > \lambda_x$

33.

The electric and magnetic field of electromagnetic waves are

1. in the opposite phase and perpendicular to each other.
2. in the opposite phase and parallel to each other.
3. in phase and perpendicular to each other.
4. in phase and parallel to each other.

34.

The velocity of electromagnetic radiation in a medium of permittivity ε_0 and permeability μ_0 is given by

1. $\sqrt{\frac{\mu_0}{\varepsilon_0}}$
2. $\sqrt{\frac{\varepsilon_0}{\mu_0}}$
3. $\sqrt{\mu_0\varepsilon_0}$
4. $\frac{1}{\sqrt{\mu_0\varepsilon_0}}$

35.

The electric field part of an electromagnetic wave in a medium is represented by $E_x = 0$;

$E_y = 2.5\frac{N}{C}\cos\left[\left(2\pi \times 10^6 \frac{rad}{s}\right)t - \left(\pi \times 10^{-2}\frac{\text{rad}}{\text{m}}\right)x\right]$; $E_z = 0$

The wave is

1. moving along x-direction with frequency 10^6 Hz and wavelength 100 m.
2. moving along x-direction with frequency 10^6 Hz and wavelength 200 m.
3. moving along —x-direction with frequency 10^6 Hz and wavelength 200 m.
4. moving along y-direction with frequency 2π x 10^6 Hz and wavelength 200 m.

36.

Which of the following statement is false for the properties of electromagnetic waves?

1. These waves do not require any material medium for propagation.
2. Both electric and magnetic field vectors attain the maxima and minima at the same place and same time.
3. The energy in the electromagnetic waves is divided equally between electric and magnetic vectors.
4. Both electric and magnetic fields are parallel to each other and perpendicular to the direction of propagation of the wave.

37.

The electric field of an electromagnetic wave in free space is given by:

$\overrightarrow{E} = 10\cos\left(10^7 t + kx\right)\hat{j}\ Vm^{-1}$, where, t and x are in seconds and meters respectively. It can be inferred that

a. The wavelength λ is 188.4 m.

b. The wavenumber k is 0.33 rad m^{-1}.

c. The wave amplitude is 10 V m^{-1}.

d. The wave is propagating along + x direction.

Which of the following pairs of statements is correct?

1. a, and b
2. b, and c
3. a, and c
4. c, and d

38.

The electric and the magnetic field, associated with an electromagnetic wave, propagating along +z-axis, can be represented by

1. $\left[\overrightarrow{\text{E}} = \text{E}_0\hat{\text{j}},\ \overrightarrow{\text{B}} = \text{B}_0\hat{\text{k}}\right]$
2. $\left[\overrightarrow{\text{E}} = \text{E}_0\hat{i},\ \overrightarrow{\text{B}} = \text{B}_0\hat{\text{j}}\right]$
3. $\left[\overrightarrow{\text{E}} = \text{E}_0\hat{\text{k}},\ \overrightarrow{\text{B}} = \text{B}_0\hat{\text{i}}\right]$
4. $\left[\overrightarrow{\text{E}} = \text{E}_0\hat{\text{j}},\ \overrightarrow{\text{B}} = \text{B}_0\hat{\text{i}}\right]$

39.

The decreasing order of wavelength Of infrared. microwave, ultraviolet and gamma rays is

1. infrared, microwave, ultraviolet, gamma rays.
2. microwave, infrared, ultraviolet, gamma rays.
3. gamma rays, ultraviolet, infrared, microwaves.
4. microwaves, gamma rays, infrared, ultraviolet.

40.

the electric field associated with an E.M. wave in vacuum is given by $\overrightarrow{\text{E}} = \hat{i}\ 40\ \cos\left(kz - 6 \times 10^8 t\right)$, where e, z, and t are in V m^{-1}, m and s respectively. The value of wave vector k is

1. 2 m^{-1}
2. 0.5 m^{-1}
3. 6 m^{-1}
4. 3 m^{-1}

41.

The ratio of the amplitude of the magnetic field to the amplitude of the electric field for an electromagnetic wave propagating in a vacuum is equal to

1. The ratio of magnetic permeability to the electric susceptibility of vacuum.
2. Unity.
3. The speed of light in vacuum.

4. Reciprocal of the speed of light in vacuum.

42.

The condition under which a microwave oven heats up a food item containing water molecules most efficiently is

1. the frequency of the microwaves must match the resonant frequency of the water molecules.
2. the frequency of the microwaves has no relation with the natural frequency of water molecules.
3. microwaves are heatwaves, so always produce heating.
4. infra-red waves produce heating in a microwave oven.

43.

Out options, which one can be used to produce a electromagnetic wave?

1. A particle.
2. An accelerating charge.
3. A charge moving at a constant velocity.
4. A stationary charge.

44.

In an electromagnetic wave in free space, the root means the square value of the electric field is E_{rms} = 6 V/rn. The peak value of the magnetic field is

1. 2.83 x 10^{-8} T
2. 0.70 x 10^{-8} T
3. 4.23 x 10^{-8} T
4. 1.41 x 10^{-8} T

45.

An em wave is propagating in a medium with a velocity $\vec{V} = V\hat{i}$. The instantaneous oscillating electric field of the em wave is along the +y-axis. Then the direction of the oscillating magnetic field of the em wave will be along

1. -y direction
2. +z direction
3. -z direction
4. -x direction

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