PHYSICS

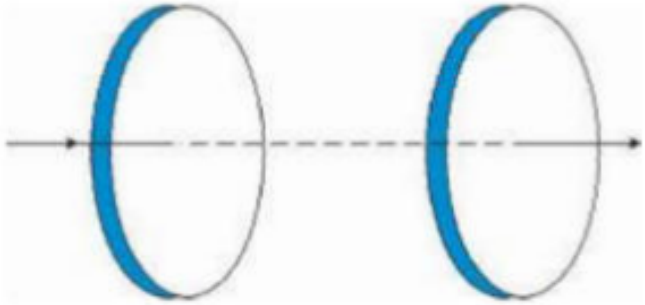
BOOKS - MODERN PUBLICATION

UNIT TEST-05

Example

1. Figure shows a capacitor made of two circular plates each of radius 12 cm, and separated by 5.0 cm. The capacitor is being charged by an

external source (not shown in the figure). The charging current is constant and equal to 0.15A. Obtain the displacement current across the plates. :



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2. Figure shows a capacitor made of two circular plates each of radius 12 cm, and separated by

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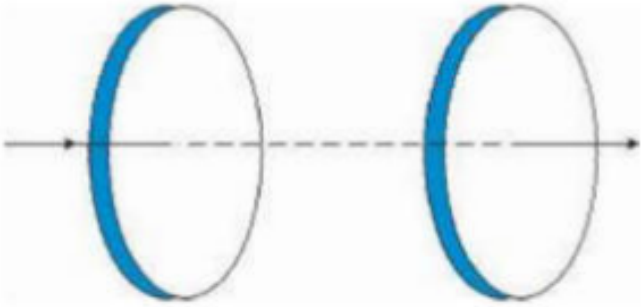

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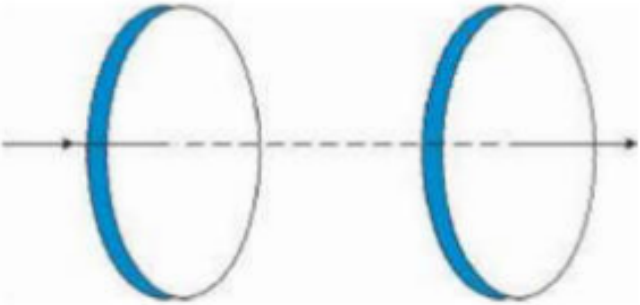

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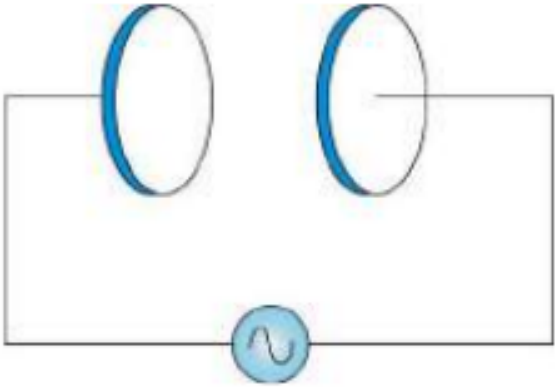
4. A parallel plate capacitor (Fig. 8.7) made of circular plates each of radius R = 6.0 cm has a capacitance C = 100 pF. The capacitor is connected to a 230 V ac supply with a (angular) frequency of $300 rads^{-1}$. What is the rms value of the conduction current? :



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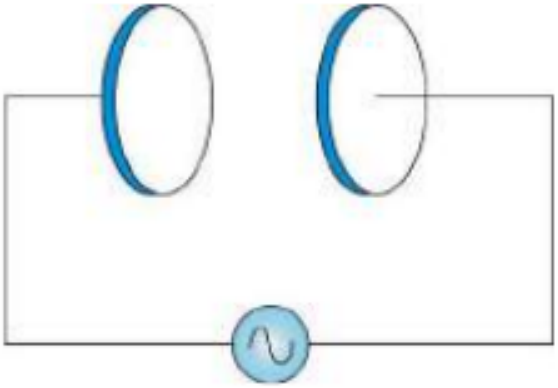
5. A parallel plate capacitor (Fig. 8.7) made of circular plates each of radius R = 6.0 cm has a capacitance C = 100 pF. The capacitor is connected to a 230 V ac supply with a (angular) frequency of $300 rads^{-1}$. Is the conduction current equal to the displacement current? :



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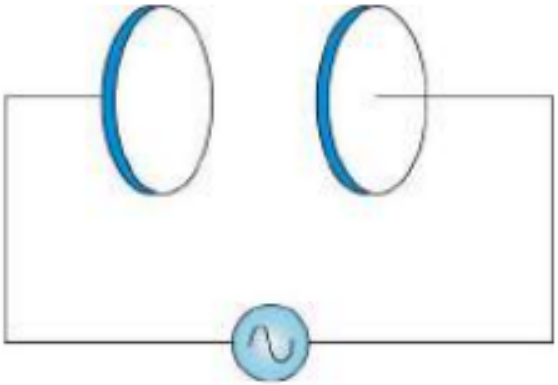
6. A parallel plate capacitor (Fig. 8.7) made of circular plates each of radius R = 6.0 cm has a capacitance C = 100 pF. The capacitor is connected to a 230 V ac supply with a (angular) frequency of $300 rads^{-1}$. What is the rms value of the conduction current? :



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7. What physical quantity is the same for X-rays of wavelength 10^{-10} m, red light of wavelength $6800\overset{\circ}{A}$ and radiowaves of wavelength 500 m?

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8. A plane electromagnetic wave travels in vacuum along z-direction. What can you sayabout the directions of its electric and magnetic field vectors? If the frequency of the wave is 30 MHz, what is its wavelength?

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9. A radio can tune in to any station in the 7.5 MHz to 12 MHz band. What is the corresponding wavelength band?

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10. A charged particle oscillates about its mean equilibrium position with a frequency of $10^9 Hz$. What is the frequency of the electromagnetic waves produced by the oscillator?

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11. The amplitude of the magnetic field part of a harmonic electromagnetic wave in vacuum is $B_0 = 510nT$. What is the amplitude of the electric field part of the wave?

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12. Suppose that the electric field amplitude of an electromagnetic wave is $E_0 = 120N/C$ and that its frequency is = 50.0 MHz. Determine, B_0, ω , k, and λ.

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13. Suppose that the electric field amplitude of an electromagnetic wave is $E_0 = 120N/C$ and that its frequency is = 50.0 MHz. Find expressions for E and B.

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14. The terminology of different parts of the electromagnetic spectrum is given in the text. Use the formula E = hv (for energy of a quantum

of radiation: photon) and obtain the photon energy in units of eV for different parts of the electromagnetic spectrum. In what way are the different scales of photon energies that you obtain related to the sources of electromagnetic radiation?

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15. In a plane electromagnetic wave, the electric field oscillates with a frequency of $2 \times 10^{10} s^{-1}$ and an amplitude of $40 V m^{-1}$.

What is the wavelength of the wave?

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16. In a plane e.m. wave the electric field oscillates sinusoidally at a frequency of 2×10^{10} Hz and amplitude $48 V m^{-1}$. What is the magnitude of oscillating magnetic field?

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17. In a plane electromagnetic wave, the electric field oscillates sinusoidally at a frequency of $2.0 \times 10^{10} Hz$ and amplitude $48 V m^{-1}$. Show

that the average energy density of the E field equals the average energy density of the B field, $[c = 3 \times 10^8 ms^{-1}.]$

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18. Suppose that the electric field part of an electromagnetic wave in vacuum is E = $\{(3.1N/C)\cos[(1.8rad/m)y+$ $(5.4 \times 10^6 rad/s)t]\}\hat{i}$. What is the direction of propagation?

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19. Suppose that the electric field part of an electromagnetic wave in vacuum is E = $\{(3.1N/C)\cos[(1.8rad/m)y+$ $(5.4\times10^{6}rad/s)t]\}\hat{i}$. What is the wavelength ?

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20. Suppose that the electric field part of an electromagnetic wave in vacuum is E = $\{(3.1N/C)\cos[(1.8rad/m)y+$ $(5.4\times10^{6}rad/s)t]\}\hat{i}$. What is the frequency ?

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21. The electric field in a plane electromagnetic wave is given by $E_y = 72 \sin\left[1.5 \times 10^3 x + 5 \times 10^{11} t\right]$ (in V m^(-1))`

What are the amplitues of the electric and magnetic fiedls associated with the wave?

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22. Suppose that the electric field part of an electromagnetic wave in vacuum is E = $\{(3.1N/C)\cos[(1.8rad/m)y+$ $(5.4\times10^{6}rad/s)t]\}\hat{i}$. Write an expression for the magnetic field part of the wave.

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23. About 5% of the power of a 100 W light bulb is converted to visible radiation. What is the average intensity of visible radiation at a distance of lm from the bulb? Assume that the

radiation is emitted isotropically and neglect reflection.

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24. About 5% of the power of a 100 W light bulb is converted to visible radiation. What is the average intensity of visible radiation at a distance of 10 m? Assume that the radiation is emitted isotropically and neglect reflection.

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25. Use the formula $\lambda_m T = 0.29cm$ K to obtain the characteristic temperature ranges for different parts of the electromagnetic spectrum. What do the numbers that you obtain tell you?

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26. Given below are some famous numbers associated with electromagnetic radiations in different contexts in physics. State the part of the electromagnetic spectrum to which each belongs. 21 cm (wavelength emitted by atomic hydrogen in interstellar space).

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27. Given below is some famous number associated with electromagnetic radiations in different contexts in physics. State the part of the electromagnetic spectrum to which belongs. 1057 MHz (frequency of radiation arising from two close energy levels in hydrogen, known as Lamb shift).

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28. Given below is some famous number associated with electromagnetic radiations in different contexts in physics. State the part of the electromagnetic spectrum to which this number belongs. 2.7 K [temperature associated with the isotropic radiation filling all space-thought to be a relic of the 'big-bang' origin of the universe].

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29. Given below is some famous number associated with electromagnetic radiations in different contexts in physics. State the part of the electromagnetic spectrum to which this number belongs. $5890\overset{\circ}{A} - 5896\overset{\circ}{A}$ [double lines of sodium]

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30. Given below is some famous number associated with electromagnetic radiations in different contexts in physics. State the part of

the electromagnetic spectrum to which this number belongs. 14.4 keV [energy of a particular transition in ^{57}Fe nucleus associated with a famous high resolution spectroscopic method (Mossbauer spectroscopy)].

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31. Answer the following questions

Long distance radio broadcasts use short wave bands. Why?

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32. Answer the following question: It is necessary to use satellites for long distance TV transmission. Why?

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33. Answer the following question: Optical and radio telescopes are built on the ground but X-ray astronomy is possible only from satellites orbiting the earth. Why?

Watch Video Solution

34. Answer the following questions

The small ozone layer on top of the stratosphere is crucial for human survival. Why?

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35. If the earth did not have atmosphere, would its average surface temperature be higher or lower than what it is now?

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36. Some scientists have predicted that a global nuclear war on the earth would be followed by a severe 'nuclear winter'with a devastating effect on life on earth. What might be the basis of this prediction?

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37. Why is the orientation of the portable radio with respect to broadcasting station important?

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38. Why does microwaves oven heats up a food item containing water molecules most efficiently?

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39. The charge on a parallel plate capacitor varies as $q = q_0 \cos 2\pi vt$. The plates are very large and close together (area=A, separation =d). Neglecting the edge effects, find the displacement current through the capacitor?

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40. A variable frequency a.c. source is connected to a capacitor. How will the displacement current change with decrease in frequency.

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41. The magnetic field of a beam emerging from a filter facing a floodlight is given by

$B_0 = 12 \times 10^{-8} \sin\left(1.20 \times 10^7 z - 3.60 \times 10^{15} t\right) T$

.

What is the average intensity of the beam?

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42. Poynting vectoors S is defined as a vector whose magnitude is equal to the wave intenstiy and whose direction is along the direction of wave propagation. Mathematically, it is given by $\vec{S} = \frac{1}{\mu_0}\vec{E} \times \vec{B}$. Show that the nature of S vs t graph.

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43. Professor C. V. Raman surprised his students by suspending freely a tiny light ball in a transparent vacuum chamber by shining a laser beam on it. Which property of EM waves was he exhibiting? Give one more example of this property.

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44. Show that the magnetic field B at a point in between the plates of a parallel-plate capacitor

during charging is $\varepsilon_0\mu_0\frac{r}{2}.\frac{dE}{dt}$(symbols having usual meanings).

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45. Electromagnetic waves with wavelength

λ_1 used in statellite communication.

λ_2 used to kill germs in water purifies.

λ_3 is used to detect leakage of oil in underground pipelines.

λ_4 is used to improve visibility in runway during fog and mist conditions.

Identify and name the part of electromagnetic spectrum to which these radiations belong.

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46. Electromagnetic waves with wavelength

λ_1 used in statellite communication.

λ_2 used to kill germs in water purifies.

λ_3 is used to detect leakage of oil in underground pipelines.

λ_4 is used to improve visibility in runway during fog and mist conditions.

Identify and name the part of electromagnetic spectrum to which these radiations belong.

Watch Video Solution

47. Electromagnetic waves with wavelength

λ_1 used in statellite communication.

λ_2 used to kill germs in water purifies.

λ_3 is used to detect leakage of oil in underground pipelines.

λ_4 is used to improve visibility in runway during fog and mist conditions.

Identify and name the part of electromagnetic spectrum to which these radiations belong.

Watch Video Solution

48. Electromagnetic waves with wavelength

λ_1 used in statellite communication.

λ_2 used to kill germs in water purifies.

λ_3 is used to detect leakage of oil in underground pipelines.

λ_4 is used to improve visibility in runway during fog and mist conditions.

Identify and name the part of electromagnetic spectrum to which these radiations belong.

Watch Video Solution

49. Electromagnetic waves with wavelength

λ_1 used in statellite communication.

λ_2 used to kill germs in water purifies.

λ_3 is used to detect leakage of oil in underground pipelines.

λ_4 is used to improve visibility in runway during fog and mist conditions.

Arrange these wavelengths in ascending order of their magnitude.

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50. identify the following electromagnetic radiations as per the wavelengths given below.Write one application of each.

1 m.

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51. you are given a $2\mu F$ parallel capacitor. How would you establish an instantaneous displacement current in 1mA iin the space between its plates?

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52. Show that the radiations pressure exerted by an EM wave of intensity I on a surface kept in vacuum is I/c.

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53. What happens to the intensity of light from a bulb if the distance from the bulb is doubled? As a laser beam travels across the length of a room, its intensity essentially remains constant. What geometrical characterstics of LASER beam is responsible for the constant intensity which is missing in the case of light from the bulb.

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54. Even though an electric field E exerts a force qE on a charged particle yet the electric field of

an EM wave does not contribute to the radiation pressure (but transfers energy). Explain?

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Exercise

1. Prove that electromagnetic waves are transverse in nature.

A. polarization

B. interference

C. reflection

D. diffraction

Answer:

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2. Dimensions of $\frac{1}{\mu_0 \varepsilon_0}$, where symbols have their usual meanings are:

A. $\left[L^{-1}T\right]$

B. $\left[L^2T^2\right]$

C. $\left[L^2t^{-2}\right]$

D. $\left[LT^{-1}\right]$.

Answer:

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3. Electromagnetic waves of frequency 5×10^{14} Hz are passed through a liquid.The wavelength of the waves in liquid is measured to be $4.5 \times 10^{-7}m$.

Calculate

the wavelength of e.m. waves in vacuum,

A. wavelength and frequency both remain unchanged

B. wavelength is doubled and the frequency remains unchanged.

C. wavelength is doubled and the frequenc becomes half.

D. wavelength is halved and the frequency remains unchanged.

Answer:

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4. Which of the following are not electromagnetic waves?

A. Cosmic - rays

B. γ - rays

C. β- rays

D. X-rays.

Answer:

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5. If a source of power 4 kW produces 10^{20} photons per second,the radiatoin belongs to a part of the spectrum called

A. microwaves

B. ultraviolet rays

C. X-rays

D. γ-rays.

Answer:

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6. Which of the following radiations has the least wavelength?

A. γ-rays

B. β- rays

C. α- rays

D. X-rays.

Answer:

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7. Infrared radiation are detected by:

A. spectrometer

B. pyrometer

C. nanometer

D. photometer

Answer:

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8. This question has statement - 1 and statement -2.Of the four choicesgiven after the statements,choose the one that best describes the two statements.

Statement-1:Sky wave signals are used for long distance radio communication.These signals are ,in general ,less stable than ground wave signals.

Statement - 2:The state of ionosphere varies

from hour to hour ,day to day and season to season.

A. Statement 1 is true ,Statement - 2 is false.

B. Statemetn - 1 is true ,Statement -2 is true,Statement - 2 is the correct explanation of Statement -1.

C. Statement -1 is true,Statement - 2 is true,Statement- 2 is not the correct explanaion of statement -1.

D. Statement-1 is false,Statement - 2 is true.

Answer:

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9. An electromagnetic radiation of frequency v ,wave-length γ,travelling with velocity c in air ,enters a glass slab of refractive index μ.the frequency,wavelegth and velocity of light in the glass slab will be respectively

A. $\frac{v}{\mu}, \frac{\gamma}{\mu}$ and $\frac{c}{\mu}$

B. $v, \frac{\gamma}{\mu}$ and $\frac{c}{\mu}$

C. v, 2γ and $\frac{c}{\mu}$

D. $\frac{2v}{\mu}$, $\frac{\gamma}{\mu}$ and c.

Answer:

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10. If ε_0 and μ_0 are the electric permittivity and magnetic permeability in free space, ε and μ are the corresponding quantities in a medium,then index of refraction of the medium is

A. $\sqrt{\frac{\mu\varepsilon}{\mu_0\varepsilon_0}}$

B. $\sqrt{(\mu_0)(\varepsilon_0)}$

C. $\frac{1}{\sqrt{\varepsilon_0 \mu_0}}$

D. $\sqrt{\varepsilon_0 \mu_0}$

Answer:

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11. If ε_0 and μ_0 are the electric permittivity and magnetic permeability in free space, ε and μ are the corresponding quantities in a medium,then index of refraction of the medium is

A. $\sqrt{\frac{elispon_0\mu}{elispon\mu_0}}$

B. $\sqrt{elispo\frac{n}{elispon_0}}$

C. $\sqrt{\frac{elispon_0\mu_0}{elispon\mu}}$

D. $\sqrt{\frac{elispon\mu}{elipon_0\mu_0}}$.

Answer:

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12. The electric and magnetic fields in an electromagnetic wave are

A. in phase and perpendicular to each other.

B. in opposite phase and perpendicular to each other.

C. in oppsite phase and parallel to each other.

D. in phase and parallel to each other.

Answer:

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13. Electromagnetic waves

Electromagnetic waves are those waves in which there are sinusoidal variations of electric and magnetic fields at right angle to each other as well as right angle to the direction of propagation. The ratio of electric vector and magnetic vector gives the velocity of light and $\overrightarrow{E} \times \overrightarrow{B}$ gives the direction of propagation of electromagnetic wave.

If $\overrightarrow{E}$ and $\overrightarrow{B}$ represent electric and magnetic field vectors of the electromagnetic wave, the

direction of propagation of electromagnetic wave is along.

A. $\vec{E}$

B. $\vec{B}$

C. $\vec{E} \times \vec{B}$

D. $\vec{B} \times \vec{E}$

Answer:

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14. The electric and magnetic fields associated with an electromagnetic wave,propagating along the Z-axis,can be reprented by

A. $\overrightarrow{E} = E_0\hat{i}, \overrightarrow{B} = B_0\widehat{J}$

B. $\overrightarrow{E} = E_0\hat{k}, \overrightarrow{B} = B_0\hat{i}$

C. $\overrightarrow{E} = E_0\hat{j}, \overrightarrow{B} = B_0\hat{i}$

D. $\overrightarrow{E} = E_0\hat{j}, \overrightarrow{B} = B_0\hat{k}.$

Answer:

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15. Which of the following statements is false for the properties of electromagnetic waves?

A. Both the electric and magnetic field vectors attain the maxima and minima at the same place and the same time.

B. The energy f electromagnetic wave is divided equally between electric and magnetic fields.

C. Both the electric and magnetic field vectors are parallel to each other and

perpendicular to the propagation of wave.

D. The electromagnetic waves do not require any material medium for propagation.

Answer:

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16. The oscillating electric field of an electromagnetic wave is given by $E_y = 30\sin\left(2 \times 10^{11}t + 300\pi x\right)vm^{-1}$.

Obtain the value of wavelength of the electromagnetic wave.

A. the wavelength γ is 188.5 m.

B. the wave number k is 0.33 rad m^{-1}.

C. the wave amplitude is $10Vm^{-1}$

D. the wave is propating along Y-direction.

Answer:

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17. The electric field of a plane electromagnetic wave in vaccum is represented by

$E_x = 0, E_y = 0.5 \cos\left[2\pi \times 10^8 (t - x/c)\right]$ and $E_z = 0.$

What is the direction of propagation of electromagnetic waes?

A. moving along X-direction with frequency $10^6 Hz$ and wavelength 100 m.

B. moving along X-direcin with frequency $10^6 Hz$ and wavelength 200 m.

C. Moving along Y-direcion with frequency $10^6 HZ$ and wavelength 200 m.

D. moving along Y-direction with frequency $2\pi \times 10^6$ Hz and wavelength 200 m.

Answer:

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18. Which of the following are not electromagnetic waves?

A. $\gamma - rays$

B. β- rays

C. X-rays

D. heart - rays

Answer:

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19. Which of the following has minimum wavelength

A. X-rays

B. ultraviolet rays

C. γ-rays

D. Cosmic rays

Answer:

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20. Arrange the given electromagnetic radiations in the descending order of their

frequencies. Infarred, X-rays, ultraviolet and gamma rays.

A. microwaves,infrared rays,ultraviolet rays,γ-rays

B. γ-rays,ultraviolet rays,γrays.

C. microwaves,γrays,infrared rays,ultraviolet rays

D. infrared rays ,microwaves,ultraviolet rays,γ rays.

Answer:

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21. The frequency of γ-rays,X-rays and ultraviolet rays are a,b and c respectively.then,

A. $a > b > c$

B. $a < b < c$

C. a=b=c

D. $a > c > b$

Answer:

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22. According to Maxwell's hypothesis, a changing electric field gives rise to

A. an e.f.

B. electric current

C. magnetic field

D. pessure gradiesnt

Answer:

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23. Velocity of light is equal to

A. $\sqrt{\varepsilon_0 \mu_0}$

B. ε_0 / μ_0

C. $\sqrt{\varepsilon_0 / \mu_0}$

D. $1 / \sqrt{\varepsilon_0 \mu_0}$.

Answer:

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24. The velocity of electromagnetic waves in free space is $3 \times 10^8 ms^{-1}$.The frequency of a radio wave of wave length 150 m is

A. 45 MHz

B. 2 MHz

C. 20 KHz

D. 2kHz

Answer:

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25. Deduce an expression for the frequency of revolution of a charged particle in a magnetic field and show that it is independent of velocity or energy of the particle.

A. velociy

B. wavelength

C. frequency

D. all these jdepend on each other.

Answer:

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26. Show that the radiations pressure exerted by an EM wave of intensity I on a surface kept in vacuum is I/c.

A. I c

B. Ic^2

C. I/c

D. I/c^2.

Answer:

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27. In general ,the wavelength of microwaves is

A. more than that of radiowaves

B. less than that of ultraviolet waves

C. more than that of infra-red waves.

D. less than that of infra-red waves.

Answer:

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28. Which of the following will deflect in electric field?

A. X-rays

B. γ-rays

C. cathode rays

D. ultraviolet rays

Answer:

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29. In these question, a statement of assertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Assertion: The displacement current goes through the gap between the plates of the capacitor ,when the charge of the capacitor does not change.

Reason: The displacement current arises in the region in which the electric field and hence the electric flux does not change with the time.

A. A

B. B

C. C

D. D

Answer:

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30. In these question, a statement of asertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Assertion:the pairs E_x, B_y nd E_y, B_x ,components of space and time varying electric field $\vec{E}$ and magnetic field $\vec{B}$ can generate a plane electromagnetic wave travelling along the Z-direction.

Reason:It is because,electromagnetic waves propagae in the direction of vectro $\vec{E} \times \vec{B}$.

A. A

B. B

C. C

D. D

Answer:

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31. In these question, a statement of assertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Assertion: the frequencies of incident ,reflected and refracted beam of monochromatic light incident from one medium to another are same.

Reason: The incident, reflected and refracted rays are coplanar.

A. A

B. B

C. C

D. D

Answer:

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32. In these question, a statement of asertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

Assertion and reason both are correct

statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Asssertion:When an electromagnetic wave enters an optically denser medium ,its frequency remains the same but its waelength and speed decrease

Reason:The frequency is an inherent charactgerstic of the radiation.The wavelength

and hence the speed decreases by a factor n,where n is refreactive index of the medium

A. A

B. B

C. C

D. D

Answer:

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33. In these question, a statement of assertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Assertion: The electromagnetic waves exert pressure on the surface of the matter, when they fall on it.

Reason: It is because, electromagnetic waves transport momentum.

A. A

B. B

C. C

D. D

Answer:

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34. In these question, a statement of asertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

Assertion and reason both are correct

statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Assertion:The electric vector is also called light vector.

Reason:The elctric vector of an electromagnetic wave is responsible for its optical effect.

A. A

B. B

C. C

D. D.

Answer:

35. In these question, a statement of asertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct

statements and reason is correct explanation for assertion.

Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Assertion:The ratio of the amplitudes of elctric and mgnetic fields is constant and it is equal to velocity of the electromagnetic waves in free

space.

Reason:It is because,$B_0 = cE_0$.

A. A

B. B

C. C

D. D.

Answer:

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36. In these question, a statement of asertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Assertion:Radio waves can be polarised.

Reason:Sound waves in air are longitudinal.

A. A

B. B

C. C

D. D.

Answer:

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37. In these question, a statement of assertion followed by a statement of reason is given .Choose the correct answer out of the following choices:

Assertion and reason both are correct statements and reason is correct explanation for assertion.

Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Assertion is correct statement but reason is wrong statement.

Assertion is wrong statement but reason is correct statement.

Assertion: Finger prints on a piece of paper may be detected by sprinkling fluorescent powder on the paper and then looking it into ultraviolet light.

Reason: the ultraviolet light can cause fluorescence.

A. A

B. B

C. C

D. D.

Answer:

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38. Name the scientist, who first:

Experimentally demonstrated the existence of electromagnetic waves.

A. Sir J.C.Bose

B. Maxwell

C. Marconi

D. Hertz.

Answer:

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39. Which of the following is not the property of light?

A. It requieres a material medim for propagation

B. It can travel through vacuum

C. It involves transporation of energy.

D. It has finite speed.

Answer:

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40. Which of the following statement is true ?

A. Both light and sound waves in air are transverse.

B. The sound waes in air are longitudinal,while the light waves are transverse

C. Both light and sound waves in air are longitudinal

D. Both ilght and sound waves can travel in vacuum.

Answer:

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41. When light passes from one medium to another medium, which one of these quantities, remains unchanged.

A. Refractive index

B. Frequency

C. Wavelength

D. Speed

Answer:

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42. Which of the following has longest wavelength ?

A. Ultraviolet rays

B. Infra-red rays

C. Radi waves

D. X-rays.

Answer:

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43. Absorption of X-rays is maximum in which of the following material sheets of the same thickness?

A. Cu

B. Au

C. Be

D. Pb

Answer:

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44. Which one is used in ionospereic propagation?

A. Ultravilet rays

B. Infrared rays

C. Radio waves

D. Light waves.

Answer:

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45. Ozone layer in atmosphere is useful,because it

A. stops ultraviolet rays.

B. absorbs pollutant gaves

C. stops green house effect

D. stop increase in temperature of atmosphere

Answer:

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46. in a wave motion, $y = a(\sin 9kx - \omega t)$, y can represent

A. elecric field

B. magnetic field

C. displacement

D. presssure

Answer:

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47. An elecric charge in uniform motion produces

A. an elecric field only

B. a magnetic field only

C. both electric and magnetic fields

D. no such field at all.

Answer:

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48. The diemnsion of energy density, $\frac{1}{2}\varepsilon_0 E^2$, where $elipson_0$ is permittivity of free space and E is electric field is :

A. MLT^{-1}

B. $ML^{-1}T^{-2}$

C. ML^2T^{-1}.

D.

Answer:

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49. Let $[\varepsilon_0]$ denote the dimensational formula of the permittivity of the vacuum and $[u_0]$ that of

the permeability of the vacuum.If M = mass,L =length,T-time and I = electric current,then

A. $[\varepsilon_0] = M^{-1}l^{-13}t^2I$

B. $[\varepsilon_0] = m^{-1}l^{-3}t^4I^2$

C. $[\mu_0] = MLT^{-2}I^{-2}$

D. $[\mu_0] = ML^2T^{-1}I.$

Answer:

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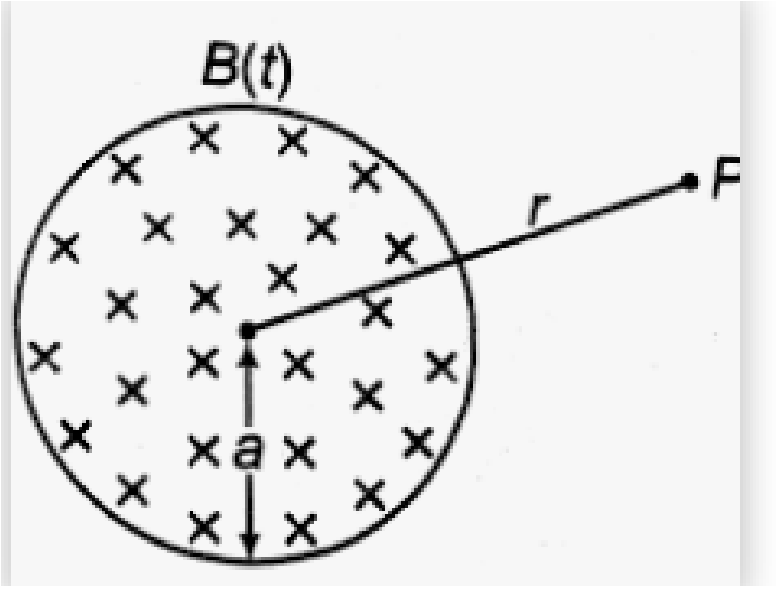
50. A uniform but time-varying magnetic field B(t) exists with in a circular region of radius a and is directed in to the plane of the paper as shown in the figure.



The magnitude of the induced electric field at the point P at a distance r from the centre of the circular region

A. is zero

B. decreases as $1/r$

C. increases as r

D. decreses as $1/r^2$.

Answer:

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51. The SI unit of displacement current is

A. H

B. A

C. Fm^{-1}

D. C

Answer:

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52. The displacement current flows in the dielectric of a capacitor, when the potential difference across its plates

A. is increasing with time

B. is decreasing with time.

C. becomes zero

D. attains a constnt value.

Answer:

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53. The displacement current is produced across the gap between the two plates of a capacitor, when the charge on the capacitor

A. is zero

B. decreases

C. increases

D. does not change.

Answer:

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54. Electromagnetic waves are produced by

A. achrage at rest.

B. a moving charge

C. an accelerating charge

D. none of the these.

Answer:

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55. Which of the following statements is a wrong one?Electromagnetic wavs

A. are produced by accelerating charges

B. are transverse in nature

C. travel with the same speed irrespective of the nature of the medium.

D. travel with veloctiy of light in vacuum.

Answer:

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56. A magnetic field can be produced by

A. a charge at rest only

B. a moving charge only

C. a changing electric field.

D. both by (B) and (C).

Answer:

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57. The speed of electromagnetic waves in vacuum is equal to

A. $\varepsilon_0\mu_0$

B. $\sqrt{\varepsilon_0\mu_0}$

C. $1/\sqrt{\varepsilon_0\mu_0}$

D. $1/\varepsilon_0\mu_0$.

Answer:

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58. Dimensions of ε_0/μ_0 is

A. LT^{-1}

B. $L^{-1}T$

C. L^2T^{-2}

D. $L^{-2}T^{2}$.

Answer:

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59. In a plane electromagnetic wave,which of the following have zero average value?

A. magnetic field

B. magnetic energy

C. electric field

D. electric enregy.

Answer:

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60. Which of the following is indepenedent of wavelength?

A. k

B. ω

C. ωk

D. k / ω.

Answer:

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61. The electric and magnetic fields associated with an electromagnetic wave,propagating along the Z-axis,can be reprented by

A. E_x, B_y

B. E_y, B_x

C. E_x, B_z

D. E_z, B_x.

Answer:

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62. A plane electromagnetic wave propagating along x directions can have the following paris of E and B:

A. $E_0 k = B_0 \omega$

B. $E_0 B_0 = \omega k$

C. $E_0 \omega = B_0 k$

D. $E_0 B_0 = mega / k.$

Answer:

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63. Red light differes from blue light in its

A. speed

B. frequency

C. intensity

D. amplitude.

Answer:

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64. Among the following ,longest waveis

A. radio wave

B. γ- ray

C. microwave.

D. X-rays.

Answer:

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65. Which is the longest wavelength?

A. radio wave

B. X-rays

C. Ultrabiolet rays

D. Infra-red rays.

Answer:

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66. Infra-red spectrum lies between

A. Radio wave and microwave region.

B. microwave nad visible region

C. visible and ultraviolet region.

D. ultraviolet and X-rays.

Answer:

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67. Which of the following represents an infrared wavelength?

A. $10^{-4}cm$

B. $10^{-5}cm$

C. $10^{-6}cm$

D. $10^{-7}cm.$

Answer:

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68. Which of the following statements is wrong?

A. Ultraviolet rays have a wavelength longer than infra-red rays.

B. Infra - red rays travel with the same velocity as visible light.

C. Inrfra-red can be focussed by a lens and can e reflected by a mirror just as visible light.

D. Infra-red rays have more heating power than visible light rays.

Answer:

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69. Finger prints on a piece f paper may be detected by sprinkling flourscent powder on the paper and then looking it in the

A. dark light

B. sun light

C. infra-red light

D. ultraviolet light.

Answer: