NEET : CHAPTER WISE TEST-7

SUBJECT :- PHYSICS DATE..
CLASS :- 12th NAME..
CHAPTER :- ELECTRO MAGNETIC WAVES SECTION..

(SECTION-A)

1. Light is an electromagnetic wave. Its speed in vacuum is given by the expression

(A) $\sqrt{\mu_o \varepsilon_o}$ (B) $\sqrt{\frac{\mu_o}{\varepsilon_o}}$

(C) $\sqrt{\frac{\varepsilon_o}{\mu_o}}$ (D) $\frac{1}{\sqrt{\mu_o \varepsilon_o}}$

2. Which radiation in sunlight, causes heating effect

(A) Ultraviolet (B) Infrared
(C) Visible light (D) All of these

3. Which of the following radiations has the least wavelength

(A) γ-rays (B) β-rays
(C) α-rays (D) *X*-rays

4. The ozone layer absorbs

(A) Infrared radiations
(B) Ultraviolet radiations
(C) *X*-rays
(D) γ-rays

5. If $\vec{E}$ and $\vec{B}$ are the electric and magnetic field vectors of E.M. waves then the direction of propagation of E.M. wave is along the direction of

(A) $\vec{E}$ (B) $\vec{B}$
(C) $\vec{E} \times \vec{B}$ (D) None of these

6. Radio waves and visible light in vacuum have

(A) Same velocity but different wavelength
(B) Continuous emission spectrum
(C) Band absorption spectrum
(D) Line emission spectrum

7. If a source is transmitting electromagnetic wave of frequency 8.2×10^6 *Hz*, then wavelength of the electromagnetic waves transmitted from the source will be

(A) 36.6 *m* (B) 40.5 *m*
(C) 42.3 *m* (D) 50.9 *m*

8. In an apparatus, the electric field was found to oscillate with an amplitude of 18 *V*/*m*. The magnitude of the oscillating magnetic field will be

(A) 4×10^{-6} *T* (B) 6×10^{-8} *T*
(C) 9×10^{-9} *T* (D) 11×10^{-11} *T*

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

(A) An e.m.f.
(B) Electric current
(C) Magnetic field
(D) Pressure radiant

10. In an electromagnetic wave, the electric and magnetising fields are $100\ V m^{-1}$ and $0.265\ A m^{-1}$. The maximum energy flow is

(A) $26.5\ W/m^2$ (B) $36.5\ W/m^2$
(C) $46.7\ W/m^2$ (D) $765\ W/m^2$

11. Maxwell's equations describe the fundamental laws of

(A) Electricity only
(B) Magnetism only
(C) Mechanics only
(D) Both (A) and (B)

12. The oscillating electric and magnetic vectors of an electromagnetic wave are oriented along

(A) The same direction but differ in phase by 90°
(B) The same direction and are in phase
(C) Mutually perpendicular directions and are in phase
(D) Mutually perpendicular directions and differ in phase by 90°

13. In which one of the following regions of the electromagnetic spectrum will the vibrational motion of molecules give rise to absorption

(A) Ultraviolet (B) Microwaves
(C) Infrared (D) Radio waves

14. An electromagnetic wave travels along *z*-axis. Which of the following pairs of space and time varying fields would generate such a wave

(A) E_x, B_y (B) E_y, B_x
(C) E_z, B_x (D) E_y, B_z

15. Which of the following rays has the maximum frequency

(A) Gamma rays (B) Blue light
(C) Infrared rays (D) Ultraviolet rays

16. A signal emitted by an antenna from a certain point can be received at another point of the surface in the form of

(A) Sky wave (B) Ground wave
(C) Sea wave (D) Both (A) and (B)

17. Approximate height of ozone layer above the ground is
(A) 60 to 70 *km*
(B) 59 *km* to 80 *km*
(C) 70 *km* to 100 *km*
(D) 100 *km* to 200 *km*

18. The electromagnetic waves do not transport
(A) Energy (B) Charge
(C) Momentum (D) Information

19. A plane electromagnetic wave is incident on a material surface. If the wave delivers momentum *p* and energy *E*, then
(A) $p = 0, E = 0$ (B) $p \neq 0, E \neq 0$
(C) $p \neq 0, E = 0$ (D) $p = 0, E \neq 0$

20. An electromagnetic wave, going through vacuum is described by $E = E_0 \sin(kx - \omega t)$. Which of the following is independent of wavelength
(A) k (B) ω (C) k/ω (D) $k\omega$

21. An electromagnetic wave going through vacuum is described by $E = E_0 \sin(kx - \omega t)$; $B = B_0 \sin(kx - \omega t)$. Which of the following equation is true
(A) $E_0 k = B_0 \omega$ (B) $E_0 \omega = B_0 k$
(C) $E_0 B_0 = \omega k$ (D) None of these

22. An *LC* resonant circuit contains a 400 *pF* capacitor and a 100 μH inductor. It is set into oscillation coupled to an antenna. The wavelength of the radiated electromagnetic waves is
(A) 377 *mm* (B) 377 *metre*
(C) 377 *cm* (D) 3.77 *cm*

23. A radio receiver antenna that is 2 *m* long is oriented along the direction of the electromagnetic wave and receives a signal of intensity $5 \times 10^{-16} W/m^2$. The maximum instantaneous potential difference across the two ends of the antenna is
(A) 1.23 μV (B) 1.23 *mV*
(C) 1.23 *V* (D) 12.3 *mV*

24. Television signals broadcast from the moon can be received on the earth while the TV broadcast from Delhi cannot be received at places about 100 *km* distant from Delhi. This is because
(A) There is no atmosphere around the moon
(B) Of strong gravity effect on TV signals
(C) TV signals travel straight and cannot follow the curvature of the earth
(D) There is atmosphere around the earth

25. A TV tower has a height of 100 *m*. The average population density around the tower is 1000 per km^2. The radius of the earth is 6.4×10^6 *m*. the population covered by the tower is
(A) 2×10^6 (B) 3×10^6
(C) 4×10^6 (D) 6×10^6

26. The wavelength 21 *cm* emitted by atomic hydrogen in interstellar space belongs to
(A) Radio waves (B) Infrared waves
(C) Microwaves (D) γ-rays

27. Which scientist experimentally proved the existence of electromagnetic waves
(A) Sir J.C. Bose (B) Maxwell
(C) Marconi (D) Hertz

28. An electromagnetic wave of frequency $\nu = 3.0\,MHz$ passes from vacuum into a dielectric medium with permitivity $\varepsilon = 4.0$. Then
(A) Wavelength is doubled and the frequency remains unchanged
(B) Wavelength is doubled and frequency becomes half
(C) Wavelength is halved and frequency remains unchanged
(D) Wavelength and frequency both remain unchanged

29. Frequency of a wave is $6 \times 10^{15}\,Hz$. The wave is
(A) Radiowave (B) Microwave
(C) X-ray (D) None of these

30. The region of the atmosphere above troposphere is known as
(A) Lithosphere (B) Uppersphere
(C) Ionosphere (D) Stratosphere

31. Which of the following electromagnetic waves have minimum frequency
(A) Microwaves (B) Audible waves
(C) Ultrasonic waves (D) Radiowaves

32. Which one of the following have minimum wavelength
(A) Ultraviolet rays (B) Cosmic rays
(C) *X*-rays (D) γ – rays

33. Radiations of intensity $0.5\ W/m^2$ are striking a metal plate. The pressure on the plate is
(A) $0.166 \times 10^{-8}\ N/m^2$
(B) $0.332 \times 10^{-8}\ N/m^2$
(C) $0.111 \times 10^{-8}\ N/m^2$
(D) $0.083 \times 10^{-8}\ N/m^2$

34. Electromagnetic waves travel in a medium which has relative permeability 1.3 and relative permittivity 2.14. Then the speed of the electromagnetic wave in the medium will be

(A) $13.6\times10^{6}\ m/s$ (B) $1.8\times10^{2}\ m/s$

(C) $3.6\times10^{8}\ m/s$ (D) $1.8\times10^{8}\ m/s$

35. The intensity of gamma radiation from a given source is *I*. On passing through 36 *mm* of lead, it is reduced to $\frac{I}{8}$. The thickness of lead which will reduce the intensity to $\frac{I}{2}$ will be

(A) 18 *mm* (B) 12 *mm*
(C) 6 *mm* (D) 9 *mm*

(SECTION-B)

36. If λ_v, λ_r and λ_m represent the wavelength of visible light *x*-rays and microwaves respectively, then

(A) $\lambda_m > \lambda_x > \lambda_v$ (B) $\lambda_v > \lambda_m > \lambda_y$

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

37. For skywave propagation of a 10 *MHz* signal, what should be the minimum electron density in ionosphere

(A) $\sim 1.2\times10^{12} m^{-3}$ (B) $\sim 10^{6} m^{-3}$

(C) $\sim 10^{14} m^{-3}$ (D) $\sim 10^{22} m^{-3}$

38. The pressure exerted by an electromagnetic wave of intensity *I* (*watts*/*m*^{2}) on a nonreflecting surface is [*c* is the velocity of light]

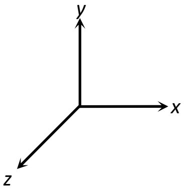
(A) Ic (B) Ic^2
(C) I/c (D) I/c^2

39. Infrared radiation was discovered in 1800 by
(A) William Wollaston
(B) William Herschel
(C) Wilhelm Roentgen
(D) Thomas Young

40. Which of the following is electromagnetic wave
(A) *X*-rays and light waves
(B) Cosmic rays and sound waves
(C) Beta rays and sound waves
(D) Alpha rays and sound waves

41. Which one of the following is not electromagnetic in nature
(A) *X*-rays (B) Gamma rays
(C) Cathode rays (D) Infrared rays

42. Light wave is travelling along y-direction. If the corresponding $\vec{E}$ vector at any time is along the x-axis, the direction of $\vec{B}$ vector at that time is along



(A) *y*-axis (B) *x*-axis
(C) + *z*-axis (D) – *z* axis

43. If *c* is the speed of electromagnetic waves in vacuum, its speed in a medium of dielectric constant *K* and relative permeability μ_r is

(A) $v = \frac{1}{\sqrt{\mu_r K}}$ (B) $v = c\sqrt{\mu_r K}$

(C) $v = \frac{c}{\sqrt{\mu_r K}}$ (D) $v = \frac{K}{\sqrt{\mu_r C}}$

44. A plane electromagnetic wave is propagating along the direction $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$, with its polarization along the direction $\hat{k}$. The correct from of the magnetic field of the wave would be (here B_0 is an appropriate constant) :

(A) $B_0\frac{\hat{i}+\hat{j}}{\sqrt{2}}\cos\left(\omega t - k\frac{\hat{i}+\hat{j}}{\sqrt{2}}\right)$

(B) $B_0\frac{\hat{i}-\hat{j}}{\sqrt{2}}\cos\left(\omega t + k\frac{\hat{i}+\hat{j}}{\sqrt{2}}\right)$

(C) $B_0\frac{\hat{i}-\hat{j}}{\sqrt{2}}\cos\left(\omega t - k\frac{\hat{i}+\hat{j}}{\sqrt{2}}\right)$

(D) $B_0\hat{k}\cos\left(\omega t - k\frac{\hat{i}+\hat{j}}{\sqrt{2}}\right)$

45. The electric fields of two plane electromagnetic plane waves in vacuum are given by :
$\vec{E}_1 = E_0\hat{j}\cos(\omega t - kx)$ and $\vec{E}_2 = E_0\hat{k}\cos(\omega t - ky)$
At t = 0, a particle of charge q is at origin with a velocity $\vec{v} = 0.8c\hat{j}$ (c is the speed of the light in vaccum). The instantaneous force experienced by the particle is :

(A) $E_0q(0.8\hat{i}+\hat{j}+0.2\hat{k})$

(B) $E_0q(-0.8\hat{i}+\hat{j}+\hat{k})$

(C) $E_0q(0.4\hat{i}-3\hat{j}+0.8\hat{k})$

(D) $E_0q(0.8\hat{i}-\hat{j}+0.4\hat{k})$

46. A plane electromagnetic wave of frequency 25 GHz is propagating in vacuum along the z-direction. At a particular point in space and time, the magnetic field is given by $\vec{B} = 5 \times 10^{-8}\hat{j}$ T. The corresponding electric field $\vec{E}$ is (Speed of light c = 3 × 10^8 ms^{-1})

(A) 1.66 × 10^{-16} $\hat{i}$ V/m

(B) $15\hat{i}$ V/m

(C) $-15\hat{i}$ V/m

(D) $-1.66 \times 10^{-16}\hat{i}$ V/m

47. The electric field of a plane electromagnetic wave is given by $\vec{E} = E_0 \frac{\hat{i}+\hat{j}}{\sqrt{2}}\cos(kz+\omega t)$. At t = 0, a positively charged particle is at the point (x, y, z) = $\left(0,0,\frac{\pi}{k}\right)$. If its instantaneous velocity at (t = 0) is $v_0\hat{k}$, the force acting on it due to the wave is :

(A) Zero

(B) parallel to $\hat{k}$

(C) antiparallel to $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$

(D) parallel to $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$

48. An electromagnetic wave of intensity 50 Wm^{-2} enters in a medium of refractive index 'n' without any loss. The ratio of the magnitudes of electric fields, and the ratio of the magnitudes of magnetic field of the wave before and after entering into the medium are respectively, given by :

(A) $\left(\sqrt{n},\sqrt{n}\right)$ (B) $\left(\frac{1}{\sqrt{n}},\sqrt{n}\right)$

(C) $\left(\sqrt{n},\frac{1}{\sqrt{n}}\right)$ (D) $\left(\frac{1}{\sqrt{n}},\frac{1}{\sqrt{n}}\right)$

49. 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
(a)	Infrared waves	(i)	To treat muscular strain
(b)	Radio waves	(ii)	For broadcasting
(c)	X-rays	(iii)	To detect fractureof bones
(d)	Ultraviolet	(iv)	Absorbed by the ozone layer of the atmosphere

	(A)	(B)	(C)	(D)
(A)	(iv)	(iii)	(ii)	(i)
(B)	(i)	(ii)	(iv)	(iii)
(C)	(iii)	(ii)	(i)	(iv)
(D)	(i)	(ii)	(iii)	(iv)

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

(A) 1.41 ×10^{-8} T (B) 2.83 ×10^{-8} T

(C) 0.70 ×10^{-8} T (D) 4.23 ×10^{-8} T