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NEET ELECTROMAGNETIC WAVES — PYQS

Max. Marks: 184 **Questions:** 46

Section A (MCQ) — 46 questions

Q.1 Match **List-I** with **List-II** : [NEET (UG) 2026]

List-I (Electromagnetic wave)		List-II (Production)	
A.	Microwave	I.	Electrons in atoms emit light when they move from a higher energy level to a lower energy level
B.	Visible light	II.	Radioactive decay of nucleus
C.	Gamma rays	III.	Vibration of atoms and molecules
D.	Infra-red rays	IV.	Klystron valve or magnetron valve

(1) A-IV, B-III, C-II, D-I (2) A-III, B-IV, C-I, D-II
(3) A-III, B-I, C-II, D-IV (4) A-IV, B-I, C-II, D-III

Scan or tap for the full solution

Q.2 The following table presents the part of the electromagnetic spectrum and their corresponding major applications. [RE-NEET (UG) 2026]

Part of the electromagnetic spectrum		Applications	
P.	Microwave	I.	For purifying the water
Q.	UV rays	II.	For warming the food
R.	Gamma rays	III.	For AM and FM communication systems
S.	Radio wave	IV.	For treating the Cancer cells

(1) P-II, Q-IV, R-III, S-I (2) P-I, Q-II, R-III, S-IV
(3) P-I, Q-IV, R-II, S-III (4) P-II, Q-I, R-IV, S-III

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Q.3 An electromagnetic wave travelling in a lossless dielectric medium having a dielectric constant, $\varepsilon_r = 9$, has the electric field, $E_x = E_0 \sin(kz - 2\pi \times 10^6 t)\ Vm^{-1}$ where E_0 is the amplitude and k is the wave vector. Among the following options, the incorrect choice is [RE-NEET (UG) 2026]

(1) The direction of propagation of the electromagnetic wave is along +z
(2) The speed of the electromagnetic wave inside the medium is $10^8\ ms^{-1}$
(3) The wavelength of the electromagnetic wave inside the medium is 300 m
(4) The magnetic field is given by the relation $B_y = \frac{E_0}{v}\sin(kz - 2\pi \times 10^6 t)$ where v is the speed of the electromagnetic wave inside the medium

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Q.4 A parallel plate capacitor made of circular plates is being charged such that the surface charge density on its plates is increasing at a constant rate with time. The magnetic field arising due to displacement current is: [NEET (UG) 2025]

(1) Non-zero everywhere with maximum at the imaginary cylindrical surface connecting peripheries of the plates
(2) Zero between the plates and non-zero outside
(3) Zero at all places
(4) Constant between the plates and zero outside the plates

Scan or tap for the full solution

Q.5 The electric field in a plane electromagnetic wave is given by $E_z = 60\cos(5x + 1.5 \times 10^9 t)$ V/m
Then expression for the corresponding magnetic field is (here subscripts denote the direction of the field) : [NEET (UG) 2025]

(1) $B_z = 60\cos(5x + 1.5 \times 10^9 t)$ T

(2) $B_y = 60\sin(5x + 1.5 \times 10^9 t)$ T

(3) $B_y = 2 \times 10^{-7}\cos(5x + 1.5 \times 10^9 t)$ T

(4) $B_x = 2 \times 10^{-7}\cos(5x + 1.5 \times 10^9 t)$ T

Scan or tap for the full solution

Q.6 A parallel plate capacitor is charged by connecting it to a battery through a resistor. If I is the current in the circuit, then in the gap between the plates: [NEET (UG) 2024]

(1) There is no current

(2) Displacement current of magnitude equal to I flows in the same direction as I

(3) Displacement current of magnitude equal to I flows in a direction opposite to that of I

(4) Displacement current of magnitude greater than I flows but can be in any direction

Scan or tap for the full solution

Q.7 The property which is not of an electromagnetic wave travelling in free space is that: [NEET (UG) 2024]

(1) They are transverse in nature

(2) The energy density in electric field is equal to energy density in magnetic field

(3) They travel with a speed equal to $\frac{1}{\sqrt{\mu_0\varepsilon_0}}$

(4) They originate from charges moving with uniform speed

Scan or tap for the full solution

Q.8 The electromagnetic radiation which has the smallest wavelength are [RE-NEET (UG) 2024]

(1) X-rays (2) Gamma rays

(3) Ultraviolet rays (4) Microwaves

Scan or tap for the full solution

Q.9 If the ratio of relative permeability and relative permittivity of a uniform medium is 1:4. The ratio of the magnitudes of electric field intensity (E) to the magnetic field intensity (H) of an EM wave propagating in that medium is (Given that $\sqrt{\frac{\mu_0}{\varepsilon_0}} = 120\pi$): [RE-NEET (UG) 2024]

(1) 30π:1 (2) 1:120π (3) 60π:1 (4) 120π:1

Scan or tap for the full solution

Q.10 In a plane electromagnetic wave travelling in free space, the electric field component oscillates sinusoidally at a frequency of 2.0×10^{10} Hz and amplitude 48 V m^{-1}. Then the amplitude of oscillating magnetic field is : (Speed of light in free space $= 3 \times 10^8$ m s^{-1}) [NEET (UG) 2023]

(1) 1.6×10^{-8} T (2) 1.6×10^{-7} T

(3) 1.6×10^{-6} T (4) 1.6×10^{-9} T

Scan or tap for the full solution

Q.11 Match **List - I** with **List - II**

List - I (Electromagnetic waves)		List - II (Wavelength)	
a.	AM radio waves	i.	10^{-10} m
b.	Microwaves	ii.	10^2 m
c.	Infrared radiations	iii.	10^{-2} m
d.	X-rays	iv.	10^{-4} m

Choose the correct answer from the options given below [NEET (UG) 2022]

(1) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

(2) (a) - (iii), (b) - (ii), (c) - (i), (d) - (iv)

(3) (a) - (iii), (b) - (iv), (c) - (ii), (d) - (i)

(4) (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

Scan or tap for the full solution

Q.12 The energy that will be ideally radiated by a 100 kW transmitter in 1 hour is [NEET (UG) 2022]

(1) 36×10^7 J (2) 36×10^4 J

(3) 36×10^5 J (4) 1×10^5 J

Scan or tap for the full solution

Q.13 When light propagates through a material medium of relative permittivity ε_r and relative permeability μ_r, the velocity of light, v is given by (c-velocity of light in vacuum) [NEET (UG) 2022]

(1) $v = c$ (2) $v = \sqrt{\frac{\mu_r}{\varepsilon_r}}$

(3) $v = \sqrt{\frac{\varepsilon_r}{\mu_r}}$ (4) $v = \frac{c}{\sqrt{\varepsilon_r\mu_r}}$

Scan or tap for the full solution

Q.14 The magnetic field of a plane electromagnetic wave is given by $\vec{B} = 3 \times 10^{-8}\cos(1.6 \times 10^3 x + 48 \times 10^{10} t)\hat{j}$, then the associated electric field will be : [NEET (UG) 2022 (Phase 2)]

(1) $9\cos(1.6\times10^{3}x+48\times10^{10}t)\hat{k}$ V/m

(2) $3\times10^{-8}\cos(1.6\times10^{3}x+48\times10^{10}t)\hat{i}$ V/m

(3) $3\times10^{-8}\sin(1.6\times10^{3}x+48\times10^{10}t)\hat{i}$ V/m

(4) $9\sin(1.6\times10^{3}x-48\times10^{10}t)\hat{k}$ V/m

Scan or tap for the full solution

Q.15 The ratio of the magnitude of the magnetic field and electric field intensity of a plane electromagnetic wave in free space of permeability μ_0 and permittivity ε_0 is (Given that c - velocity of light in free space) [NEET (UG) 2022 (Phase 2)]

(1) $\frac{\sqrt{\mu_0\varepsilon_0}}{c}$ (2) c

(3) $\frac{1}{c}$ (4) $\frac{c}{\sqrt{\mu_0\varepsilon_0}}$

Scan or tap for the full solution

Q.16 A capacitor of capacitance 'C', is connected across an ac source of voltage V, given by

$V = V_0\sin\omega t$

The displacement current between the plates of the capacitor, would then be given by : [NEET (UG) 2021]

(1) $I_d = V_0\omega C\sin\omega t$ (2) $I_d = V_0\omega C\cos\omega t$

(3) $I_d = \frac{V_0}{\omega C}\cos\omega t$ (4) $I_d = \frac{V_0}{\omega C}\sin\omega t$

Scan or tap for the full solution

Q.17 For a plane electromagnetic wave propagating in x-direction, which one of the following combination gives the correct possible directions for electric field (E) and magnetic field (B) respectively? [NEET (UG) 2021]

(1) $-\hat{j}+\hat{k},\ -\hat{j}+\hat{k}$ (2) $\hat{j}+\hat{k},\ \hat{j}+\hat{k}$

(3) $-\hat{j}+\hat{k},\ -\hat{j}-\hat{k}$ (4) $\hat{j}+\hat{k},\ -\hat{j}-\hat{k}$

Scan or tap for the full solution

Q.18 The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is : (c = speed of electromagnetic waves) [NEET (UG) 2020]

(1) 1 : 1 (2) 1 : c (3) 1 : c^2 (4) c : 1

Scan or tap for the full solution

Q.19 Light with an average flux of 20 W/cm^2 falls on a non-reflecting surface at normal incidence having surface area 20 cm^2. The energy received by the surface during time span of 1 minute is : [NEET (UG) 2020]

(1) 12×10^3 J (2) 24×10^3 J

(3) 48×10^3 J (4) 10×10^3 J

Scan or tap for the full solution

Q.20 Which colour of the light has the longest wavelength? [NEET (UG) 2019]

(1) blue (2) violet (3) red (4) green

Scan or tap for the full solution

Q.21 A parallel plate capacitor of capacitance 20 μF is being charged by a voltage source whose potential is changing at the rate of 3 V/s. The conduction current through the connecting wires, and the displacement current through the plates of the capacitor, would be, respectively : [NEET (UG) 2019]

(1) zero, zero (2) zero, 60 μA

(3) 60 μA, 60 μA (4) 60 μA, zero

Scan or tap for the full solution

Q.22 An EM wave is propagating in a medium with a velocity $\vec{v} = v\hat{i}$. The instantaneous oscillating electric field of this em wave is along +y axis. Then the direction of oscillating magnetic field of the em wave will be along [NEET 2018]

(1) −z direction (2) +z direction

(3) −y direction (4) −x direction

Scan or tap for the full solution

Q.23 In an electromagnetic wave in free space the root mean square value of the electric field is $E_{rms} = 6$ V m^{-1}. The peak value of the magnetic field is [NEET 2017]

(1) 2.83×10^{-8} T (2) 0.70×10^{-8} T

(3) 4.23×10^{-8} T (4) 1.41×10^{-8} T

Scan or tap for the full solution

Q.24 Out of the following options which one can be used to produce a propagating electromagnetic wave? [NEET 2016 (Phase 1)]

(1) A chargeless particle

(2) An accelerating charge

(3) A charge moving at constant velocity

(4) A stationary charge

Scan or tap for the full solution

Q.25 A 100 Ω resistance and a capacitor of 100 Ω reactance are connected in series across a 220 V source. When the capacitor is 50% charged, the peak value of the displacement current is [NEET 2016 (Phase 2)]

(1) 2.2 A (2) 11 A
(3) 4.4 A (4) $11\sqrt{2}$ A

Scan or tap for the full solution

Q.26 The energy of the em waves is of the order of 15 keV. To which part of the spectrum does it belong ? [AIPMT 2015]

(1) Ultraviolet rays (2) γ-rays
(3) X-rays (4) Infra-red rays

Scan or tap for the full solution

Q.27 A radiation of energy 'E' falls normally on a perfectly reflecting surface. The momentum transferred to the surface is (C = Velocity of light) [AIPMT 2015 (Cancelled)]

(1) $\frac{2E}{C^2}$ (2) $\frac{E}{C^2}$ (3) $\frac{E}{C}$ (4) $\frac{2E}{C}$

Scan or tap for the full solution

Q.28 Light with an energy flux of 25×10^4 W m^{-2} falls on a perfectly reflecting surface at normal incidence. If the surface area is 15 cm^2, the average force exerted on the surface is [AIPMT 2014]

(1) 1.25×10^{-6} N (2) 2.50×10^{-6} N
(3) 1.20×10^{-6} N (4) 3.0×10^{-6} N

Scan or tap for the full solution

Q.29 The condition under which a microwave oven heats up a food item containing water molecules most efficiently is [NEET 2013]

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

Scan or tap for the full solution

Q.30 An electromagnetic wave of frequency ν = 3.0 MHz passes from vacuum into a dielectric medium with relative permittivity ε_r = 4.0. Then [NEET 2013 (Karnataka)]

(1) Wavelength is doubled and frequency becomes half.
(2) Wavelength is halved and frequency remains unchanged.
(3) Wavelength and frequency both remain unchanged.
(4) Wavelength is doubled and frequency unchanged.

Scan or tap for the full solution

Q.31 The ratio of amplitude of magnetic field to the amplitude of electric field for an electromagnetic wave propagating in vacuum is equal to [AIPMT 2012 (Mains)]

(1) the speed of light in vacuum
(2) reciprocal of speed of light in vacuum
(3) the ratio of magnetic permeability to the electric susceptibility of vacuum
(4) unity

Scan or tap for the full solution

Q.32 The electric field associated with an em wave in vacuum is given by $\vec{E} = \hat{i}\,40\cos(kz - 6 \times 10^8 t)$ where E, z and t are in volt/m, meter and seconds respectively. The value of wave vector k is [AIPMT 2012 (Prelims)]

(1) 2 m^{-1} (2) 0.5 m^{-1} (3) 6 m^{-1} (4) 3 m^{-1}

Scan or tap for the full solution

Q.33 The electric and the magnetic field, associated with an e.m. wave, propagating along the +z-axis, can be represented by [AIPMT 2011 (Prelims)]

(1) $\vec{E} = E_0\hat{i},\ \vec{B} = B_0\hat{j}$ (2) $\vec{E} = E_0\hat{k},\ \vec{B} = B_0\hat{i}$
(3) $\vec{E} = E_0\hat{j},\ \vec{B} = B_0\hat{i}$ (4) $\vec{E} = E_0\hat{j},\ \vec{B} = B_0\hat{k}$

Scan or tap for the full solution

Q.34 The decreasing order of wavelength of infrared, microwave, ultraviolet and gamma rays is [AIPMT 2011 (Prelims)]

(1) microwave, infrared, ultraviolet, gamma rays
(2) gamma rays, ultraviolet, infrared, microwaves
(3) microwaves, gamma rays, infrared, ultraviolet
(4) infrared, microwave, ultraviolet, gamma rays

Scan or tap for the full solution

Q.35 Which of the following rays are not electromagnetic waves? [AIPMT 2003]

(1) X-rays (2) γ-rays (3) β-rays (4) heat rays

Scan or tap for the full solution

Q.36 The electric field of an electromagnetic wave in free space is given by $\vec{E} = 10\cos(10^7 t + kx)\hat{j}$ V/m, where t and x are in seconds and metres respectively. It can be inferred that

Which one of the following pairs of statements is correct ?

A. the wavelength λ is 188.4 m.
B. the wave number k is 0.33 rad/m.
C. the wave amplitude is 10 V/m.
D. the wave is propagating along +x direction.

[AIPMT 2010 (Mains)]

(1) C and D only (2) A and B only
(3) B and C only (4) A and C only

Scan or tap for the full solution

Q.37 Which of the following statements is false for the properties of electromagnetic waves? [AIPMT 2010 (Prelims)]

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

Scan or tap for the full solution

Q.38 The electric field part of an electromagnetic wave in a medium is represented by $E_x = 0$;

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

$E_z = 0$. The wave is [AIPMT 2009]

(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 $2\pi \times 10^6$ Hz and wavelength 200 m.

Scan or tap for the full solution

Q.39 The velocity of electromagnetic radiation in a medium of permittivity ε_0 and permeability μ_0 is given by [AIPMT 2008]

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

Scan or tap for the full solution

Q.40 The electric and magnetic field of an electromagnetic wave are [AIPMT 2007]

(1) in opposite phase and perpendicular to each other
(2) in opposite phase and parallel to each other
(3) in phase and perpendicular to each other
(4) in phase and parallel to each other

Scan or tap for the full solution

Q.41 If λ_v, λ_x and λ_m represent the wavelengths of visible light, X-rays and microwaves respectively, then [AIPMT 2005]

(1) $\lambda_m > \lambda_x > \lambda_v$ (2) $\lambda_m > \lambda_v > \lambda_x$
(3) $\lambda_v > \lambda_x > \lambda_m$ (4) $\lambda_v > \lambda_m > \lambda_x$

Scan or tap for the full solution

Q.42 We consider the radiation emitted by the human body. Which one of the following statements is true? [AIPMT 2003]

(1) The radiation emitted is in the infra-red region
(2) The radiation 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

Scan or tap for the full solution

Q.43 The velocity of electromagnetic wave is parallel to [AIPMT 2002]

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

Scan or tap for the full solution

Q.44 What is the cause of greenhouse effect? [AIPMT 2002]

(1) infra-red rays (2) ultra violet rays
(3) X-rays (4) radio waves.

Scan or tap for the full solution

Q.45 Biological importance of ozone layer is [AIPMT 2001]

(1) it stops ultraviolet rays

(2) ozone layer reduces greenhouse effect

(3) ozone layer reflects radio waves

(4) ozone layer controls O_2/H_2 ratio in atmosphere

Scan or tap for the full solution

Q.46 The frequency order for γ-rays (a), X-rays (b), UV rays (c) is [AIPMT 2000]

(1) b > a > c (2) a > b > c

(3) c > b > a (4) a > c > b

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7
Ans.	**4**	**4**	**3, 4**	**1**	**3**	**2**	**4**
Ques.	8	9	10	11	12	13	14
Ans.	**2**	**3**	**2**	**4**	**1**	**4**	**1**
Ques.	15	16	17	18	19	20	21
Ans.	**3**	**2**	**3**	**1**	**2**	**3**	**3**
Ques.	22	23	24	25	26	27	28
Ans.	**2**	**1**	**2**	**1**	**3**	**4**	**2**
Ques.	29	30	31	32	33	34	35
Ans.	**3**	**2**	**2**	**1**	**1**	**1**	**3**
Ques.	36	37	38	39	40	41	42
Ans.	**4**	**3**	**2**	**1**	**3**	**2**	**1**
Ques.	43	44	45	46			
Ans.	**2**	**1**	**1**	**2**			