

NEET DUAL NATURE OF RADIATION AND MATTER — PHOTON: ENERGY, MOMENTUM AND RADIATION PRESSURE — PYQS

Max. Marks: 44
Questions: 11

Section A (MCQ) — 11 questions

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

List-I		List-II	
A.	$E = h\nu$	I.	de Broglie wavelength
B.	Diffraction and Interference	II.	Particle nature of light
C.	$\lambda = h/p$	III.	Wave nature of light
D.	Compton effect	IV.	Energy of photon

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

 Scan or tap for the full solution 

Q.2 A photon and an electron, each of 20 eV energy, move in free space. The ratio of linear momentum of electron p_e to that of photon p_{ph} , $\frac{p_e}{p_{ph}}$ is:

[Take speed of light = 3×10^8 m s⁻¹, charge of electron = -1.6×10^{-19} C and mass of electron = 9×10^{-31} kg] [RE-NEET (UG) 2026]

- (1) 275 (2) $\frac{2}{450}$ (3) $\frac{1}{250}$ (4) 225

 Scan or tap for the full solution 

Q.3 If c is the velocity of light in free space, the correct statements about photon among the following are:

- A. The energy of a photon is $E = h\nu$.
 B. The velocity of a photon is c .
 C. The momentum of a photon, $p = \frac{h\nu}{c}$.

D. In a photon-electron collision, both total energy and total momentum are conserved.
 E. Photon possesses positive charge.
 Choose the correct answer from the options given below:

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

 Scan or tap for the full solution 

Q.4 The minimum wavelength of X-rays produced by an electron accelerated through a potential difference of V volts is proportional to :

[NEET (UG) 2023]

- (1) $\frac{1}{V}$ (2) $\frac{1}{\sqrt{V}}$ (3) V^2 (4) $\sqrt{V}$

 Scan or tap for the full solution 

Q.5 The number of photons per second on an average emitted by the source of monochromatic light of wavelength 600 nm, when it delivers the power of 3.3×10^{-3} watt will be : ($h = 6.6 \times 10^{-34}$ J s)

[NEET (UG) 2021]

- (1) 10^{15} (2) 10^{18} (3) 10^{17} (4) 10^{16}

 Scan or tap for the full solution 

Q.6 A 200 W sodium street lamp emits yellow light of wavelength 0.6 μ m. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is

[AIPMT 2012 (Prelims)]

- (1) 1.5×10^{20} (2) 6×10^{18}
 (3) 62×10^{20} (4) 3×10^{19}

 Scan or tap for the full solution 

Q.7 A radioactive nucleus of mass M emits a photon of frequency ν and the nucleus recoils. The recoil energy will be

[AIPMT 2011 (Prelims)]

- (1) $Mc^2 - h\nu$ (2) $h^2\nu^2/2Mc^2$
 (3) zero (4) $h\nu$

 Scan or tap for the full solution 

Q.8 A source S_1 is producing 10^{15} photons per second of wavelength 5000 Å. Another source S_2 is producing 1.02×10^{15} photons per second of wavelength 5100 Å. Then, (power of S_2)/(power of S_1) is equal to

[AIPMT 2010 (Prelims)]

- (1) 1.00 (2) 1.02 (3) 1.04 (4) 0.98

 Scan or tap for the full solution 

Q.9 Monochromatic light of wavelength 667 nm is produced by a helium neon laser. The power emitted is 9 mW. The number of photons arriving per sec. on the average at a target irradiated by this beam is

[AIPMT 2009]

- (1) 3×10^{16} (2) 9×10^{15} (3) 3×10^{19} (4) 9×10^{17}

Scan or tap for the full solution



Q.10 Monochromatic light of frequency 6.0×10^{14} Hz is produced by a laser. The power emitted is 2×10^{-3} W. The number of photons emitted, on the average, by the source per second is [AIPMT 2007]

- (1) 5×10^{16} (2) 5×10^{17} (3) 5×10^{14} (4) 5×10^{15}

Scan or tap for the full solution



Q.11 The momentum of a photon of energy 1 MeV in kg m/s will be [AIPMT 2006]

- (1) 5×10^{-22} (2) 0.33×10^6
(3) 7×10^{-24} (4) 10^{-22}

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	4	2	1	4	1	2	1	1	4	1