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NEET ATOMS — PYQS

Max. Marks: 196 **Questions:** 49

Section A (MCQ) — 49 questions

Q.1 In the first excited state of hydrogen atom, the energy of its electron is −3.4 eV. The radial distance of the electron from the hydrogen nucleus in this case is approximately :
(Take 1 eV = 1.6×10^{-19} J, e = 1.6×10^{-19} C and $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ N m^2/C^2) [NEET (UG) 2026]

(1) 2.1×10^{-8} m (2) 2.1×10^{-10} m
(3) 2.1×10^{-11} m (4) 2.1×10^{-9} m

Scan or tap for the full solution

Q.2 Consider that an electron is revolving in an excited state of Hydrogen atom with velocity $\sqrt{25.6} \times 10^5$ ms^{-1}. The radius of the orbit is $x \times 10^{-9}$ m. The value of x is:
[Take the mass of electron to be 9×10^{-31} kg, charge of electron = -1.6×10^{-19} C and $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ Nm^{2}C^{-2}] [RE-NEET (UG) 2026]

(1) 1 (2) 4 (3) 3 (4) 2

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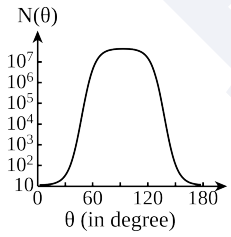
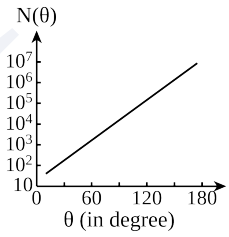
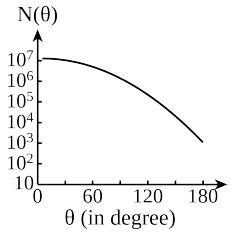
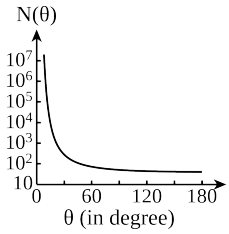
Q.3 In Geiger-Marsden experiment, the number of scattered α-particles N(θ) is plotted as a function of scattering angle θ. Which of the following options represents the correct plot? [RE-NEET (UG) 2026]

(1) 

(2) 

(3) 

(4) 

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Q.4 A particle of mass m is moving around the origin with a constant force F pulling it towards the origin. If Bohr model is used to describe its motion, the radius of the nth orbit and the particle's speed v in the orbit depend on n as [NEET (UG) 2025]

(1) $r \propto n^{2/3}$; $v \propto n^{1/3}$ (2) $r \propto n^{4/3}$; $v \propto n^{-1/3}$
(3) $r \propto n^{1/3}$; $v \propto n^{1/3}$ (4) $r \propto n^{1/3}$; $v \propto n^{2/3}$

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Q.5 De-Broglie wavelength of an electron orbiting in the n = 2 state of hydrogen atom is close to
(Given Bohr radius = 0.052 nm) [NEET (UG) 2025]

(1) 1.67 nm (2) 2.67 nm
(3) 0.067 nm (4) 0.67 nm

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Q.6 Given below are two statements:
Statement-I: Atoms are electrically neutral as they contain equal number of positive and negative charges.
Statement-II: Atoms of each element are stable and emit their characteristic spectrum.

In the light of the above statements, choose the most appropriate answer from the options given below. [NEET (UG) 2024]

(1) Both Statement-I and Statement-II are correct
(2) Both Statement-I and Statement-II are incorrect
(3) Statement-I is correct but Statement-II is incorrect
(4) Statement-I is incorrect but Statement-II is correct

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Q.7 Match **List I** with **List II**:

List I (Spectral Lines of Hydrogen for transitions from)		List II (Wavelengths (nm))	
A.	$n_2 = 3$ to $n_1 = 2$	I.	410.2
B.	$n_2 = 4$ to $n_1 = 2$	II.	434.1
C.	$n_2 = 5$ to $n_1 = 2$	III.	656.3
D.	$n_2 = 6$ to $n_1 = 2$	IV.	486.1

Choose the correct answer from the options given below: [NEET (UG) 2024]

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

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

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

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

Solution

Q.8 The spectral series which corresponds to the electronic transition from the levels $n_2 = 5, 6, \ldots$ to the level $n_1 = 4$ is [RE-NEET (UG) 2024]

(1) Pfund series (2) Brackett series

(3) Lyman series (4) Balmer series

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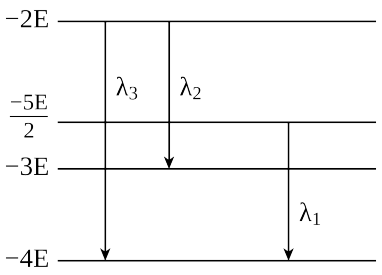
Q.9 Some energy levels of a molecule are shown in the figure with their wavelengths of transitions. Then : [RE-NEET (UG) 2024]



(1) $\lambda_3 > \lambda_2, \lambda_1 = 2\lambda_2$ (2) $\lambda_3 > \lambda_2, \lambda_1 = 4\lambda_2$

(3) $\lambda_1 > \lambda_2, \lambda_2 = 2\lambda_3$ (4) $\lambda_2 > \lambda_1, \lambda_2 = 2\lambda_3$

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Q.10 In hydrogen spectrum, the shortest wavelength in the Balmer series is λ. The shortest wavelength in the Brackett series is : [NEET (UG) 2023]

(1) 4λ (2) 9λ (3) 16λ (4) 2λ

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Q.11 The radius of inner most orbit of hydrogen atom is 5.3×10^{-11} m. What is the radius of third allowed orbit of hydrogen atom? [NEET (UG) 2023]

(1) 1.06 Å (2) 1.59 Å (3) 4.77 Å (4) 0.53 Å

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Q.12 Let T_1 and T_2 be the energy of an electron in the first and second excited states of hydrogen atoms, respectively. According to the Bohr's model of an atom, the ratio $T_1:T_2$ is [NEET (UG) 2022]

(1) 1:4 (2) 4:1 (3) 4:9 (4) 9:4

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Q.13 Let R_1 be the radius of the second stationary orbit and R_2 be the radius of the fourth stationary orbit of an electron in Bohr's model. The ratio $\frac{R_1}{R_2}$ is : [NEET (UG) 2022 (Phase 2)]

(1) 4 (2) 0.25 (3) 0.5 (4) 2

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Q.14 For which one of the following, Bohr model is not valid? [NEET (UG) 2020]

(1) Singly ionised helium atom (He^+)

(2) Deuteron atom

(3) Singly ionised neon atom (Ne^+)

(4) Hydrogen atom

Solution

Q.15 α-particle consists of : [NEET (UG) 2019]

(1) 2 electrons, 2 protons and 2 neutrons

(2) 2 electrons and 4 protons only

(3) 2 protons only

(4) 2 protons and 2 neutrons only

Solution

Q.16 The total energy of an electron in an atom in an orbit is −3.4 eV. Its kinetic and potential energies are, respectively. [NEET (UG) 2019]

(1) 3.4 eV, −6.8 eV (2) 3.4 eV, 3.4 eV

(3) −3.4 eV, −3.4 eV (4) −3.4 eV, −6.8 eV

Scan or tap for the full solution

Q.17 The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom, is [NEET 2018]

(1) 1:1 (2) 1:−1 (3) 2:−1 (4) 1:−2

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Q.18 The ratio of wavelengths of the last line of Balmer series and the last line of Lyman series is [NEET 2017]

(1) 1 (2) 4 (3) 0.5 (4) 2

Scan or tap for the full solution

Q.19 Given the value of Rydberg constant is 10^7 m^{-1}, the wave number of the last line of the Balmer series in hydrogen spectrum will be [NEET 2016 (Phase 1)]

(1) 0.25×10^7 m^{-1} (2) 2.5×10^7 m^{-1}

(3) 0.025×10^4 m^{-1} (4) 0.5×10^7 m^{-1}

Scan or tap for the full solution

Q.20 When an α-particle of mass m moving with velocity v bombards on a heavy nucleus of charge Ze, its distance of closest approach from the nucleus depends on m as [NEET 2016 (Phase 1)]

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

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Q.21 Electrons of mass m with de-Broglie wavelength λ fall on the target in an X-ray tube. The cutoff wavelength (λ_0) of the emitted X-ray is

[NEET 2016 (Phase 2)]

(1) $\lambda_0 = \frac{2mc\lambda^2}{h}$ (2) $\lambda_0 = \frac{2h}{mc}$

(3) $\lambda_0 = \frac{2m^2c^2\lambda^3}{h^2}$ (4) $\lambda_0 = \lambda$

Scan or tap for the full solution

Q.22 If an electron in a hydrogen atom jumps from the 3rd orbit to the 2nd orbit, it emits a photon of wavelength λ. When it jumps from the 4th orbit to the 3rd orbit, the corresponding wavelength of the photon will be

[NEET 2016 (Phase 2)]

(1) $\frac{16}{25}\lambda$ (2) $\frac{9}{16}\lambda$ (3) $\frac{20}{7}\lambda$ (4) $\frac{20}{13}\lambda$

Scan or tap for the full solution

Q.23 In the spectrum of hydrogen, the ratio of the longest wavelength in the Lyman series to the longest wavelength in the Balmer series is [AIPMT 2015]

(1) $\frac{27}{5}$ (2) $\frac{5}{27}$ (3) $\frac{4}{9}$ (4) $\frac{9}{4}$

Scan or tap for the full solution

Q.24 Consider 3rd orbit of He^+ (Helium), using non-relativistic approach, the speed of electron in this orbit will be [given K = 9 × 10^9 constant, Z = 2 and h (Planck's Constant) = 6.6 × 10^{-34} J s]

[AIPMT 2015 (Cancelled)]

(1) 0.73 × 10^6 m/s (2) 3.0 × 10^8 m/s

(3) 2.92 × 10^6 m/s (4) 1.46 × 10^6 m/s

Scan or tap for the full solution

Q.25 Hydrogen atom in ground state is excited by a monochromatic radiation of $\lambda = 975$ Å. Number of spectral lines in the resulting spectrum emitted will be [AIPMT 2014]

(1) 3 (2) 2 (3) 6 (4) 10

Scan or tap for the full solution

Q.26 Ratio of longest wave lengths corresponding to Lyman and Balmer series in hydrogen spectrum is

[NEET 2013]

(1) $\frac{7}{29}$ (2) $\frac{9}{31}$ (3) $\frac{5}{27}$ (4) $\frac{3}{23}$

Scan or tap for the full solution

Q.27 An electron in hydrogen atom makes a transition $n_1 \longrightarrow n_2$ where n_1 and n_2 are principal quantum numbers of the two states. Assuming Bohr's model to be valid, the time period of the electron in the initial state is eight times that in the final state. The possible values of n_1 and n_2 are

[NEET 2013 (Karnataka)]

(1) $n_1 = 6$ and $n_2 = 2$ (2) $n_1 = 8$ and $n_2 = 1$

(3) $n_1 = 8$ and $n_2 = 2$ (4) $n_1 = 4$ and $n_2 = 2$

Scan or tap for the full solution

Q.28 The transition from the state n = 3 to n = 1 in a hydrogen like atom results in ultraviolet radiation. Infrared radiation will be obtained in the transition from [AIPMT 2012 (Mains)]

(1) $2 \longrightarrow 1$ (2) $3 \longrightarrow 2$

(3) $4 \longrightarrow 2$ (4) $4 \longrightarrow 3$

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Q.29 Electron in hydrogen atom first jumps from third excited state to second excited state and then from second excited to the first excited state. The ratio of the wavelengths $\lambda_1:\lambda_2$ emitted in the two cases is

[AIPMT 2012 (Prelims)]

(1) $\frac{7}{5}$ (2) $\frac{27}{20}$ (3) $\frac{27}{5}$ (4) $\frac{20}{7}$

Scan or tap for the full solution

Q.30 An electron of a stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom acquired as a result of photon emission will be [AIPMT 2012 (Prelims)]

(1) $\frac{24hR}{25m}$ (2) $\frac{25hR}{24m}$ (3) $\frac{25m}{24hR}$ (4) $\frac{24m}{25hR}$

Scan or tap for the full solution

Q.31 An electron in the hydrogen atom jumps from excited state n to the ground state. The wavelength so emitted illuminates a photosensitive material having work function 2.75 eV. If the stopping potential of the photoelectron is 10 V, then the value of n is [AIPMT 2011 (Mains)]

(1) 2 (2) 3 (3) 4 (4) 5

Scan or tap for the full solution

Q.32 Out of the following which one is not a possible energy for a photon to be emitted by hydrogen atom according to Bohr's atomic model?

[AIPMT 2011 (Mains)]

(1) 0.65 eV (2) 1.9 eV
(3) 11.1 eV (4) 13.6 eV

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Q.33 The wavelength of the first line of Lyman series for hydrogen atom is equal to that of the second line of Balmer series for a hydrogen-like ion. The atomic number Z of hydrogen-like ion is [AIPMT 2011 (Prelims)]

(1) 3 (2) 4 (3) 1 (4) 2

Scan or tap for the full solution

Q.34 The energy of a hydrogen atom in the ground state is −13.6 eV. The energy of a He^+ ion in the first excited state will be [AIPMT 2010 (Prelims)]

(1) −13.6 eV (2) −27.2 eV
(3) −54.4 eV (4) −6.8 eV

Scan or tap for the full solution

Q.35 The energy of a hydrogen atom in the ground state is −13.6 eV. The energy of a He^+ ion in the first excited state will be [AIPMT 2010 (Prelims)]

(1) −13.6 eV (2) −27.2 eV
(3) −54.4 eV (4) −6.8 eV

Scan or tap for the full solution

Q.36 An alpha nucleus of energy $\frac{1}{2}mv^2$ bombards a heavy nuclear target of charge Ze. Then the distance of closest approach for the alpha nucleus will be proportional to [AIPMT 2010 (Prelims)]

(1) $\frac{1}{Ze}$ (2) v^2 (3) $\frac{1}{m}$ (4) $\frac{1}{v^4}$

Scan or tap for the full solution

Q.37 In a Rutherford scattering experiment when a projectile of charge z_1 and mass M_1 approaches a target nucleus of charge z_2 and mass M_2, the distance of closest approach is r_0. The energy of the projectile is [AIPMT 2009]

(1) directly proportional to z_1z_2
(2) inversely proportional to z_1
(3) directly proportional to mass M_1
(4) directly proportional to $M_1 \times M_2$

Solution

Q.38 The ionization energy of the electron in the hydrogen atom in its ground state is 13.6 eV. The atoms are excited to higher energy levels to emit radiations of 6 wavelengths. Maximum wavelength of emitted radiation corresponds to the transition between [AIPMT 2009]

(1) n = 3 to n = 1 states (2) n = 2 to n = 1 states
(3) n = 4 to n = 3 states (4) n = 3 to n = 2 states

Scan or tap for the full solution

Q.39 In the phenomenon of electric discharge through gases at low pressure, the coloured glow in the tube appears as a result of [AIPMT 2008]

(1) collisions between the charged particles emitted from the cathode and the atoms of the gas
(2) collision between different electrons of the atoms of the gas
(3) excitation of electrons in the atoms
(4) collision between the atoms of the gas

Scan or tap for the full solution

Q.40 The ground state energy of hydrogen atom is −13.6 eV. When its electron is in the first excited state, its excitation energy is [AIPMT 2008]

(1) 10.2 eV (2) 0
(3) 3.4 eV (4) 6.8 eV

Solution

Q.41 The total energy of electron in the ground state of hydrogen atom is −13.6 eV. The kinetic energy of an electron in the first excited state is [AIPMT 2007]

(1) 6.8 eV (2) 13.6 eV
(3) 1.7 eV (4) 3.4 eV

Scan or tap for the full solution

Q.42 Ionization potential of hydrogen atom is 13.6 eV. Hydrogen atoms in the ground state are excited by monochromatic radiation of photon energy 12.1 eV. According to Bohr's theory, the spectral lines emitted by hydrogen will be [AIPMT 2006]

(1) one (2) two (3) three (4) four

Scan or tap for the full solution

Q.43 The total energy of an electron in the first excited state of hydrogen atom is about −3.4 eV. Its kinetic energy in this state is [AIPMT 2005]

(1) 3.4 eV (2) 6.8 eV
(3) −3.4 eV (4) −6.8 eV

Scan or tap for the full solution

Q.44 Energy levels A, B and C of a certain atom corresponding to increasing values of energy i.e. $E_A < E_B < E_C$. If λ_1, λ_2 and λ_3 are wavelengths of radiations corresponding to transitions C to B, B to A and C to A respectively, which of the following relations is correct? [AIPMT 2005]

(1) $\lambda_3 = \lambda_1 + \lambda_2$ (2) $\lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_1 + \lambda_2}$

(3) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ (4) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

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Q.45 The Bohr model of atoms [AIPMT 2004]

(1) Assumes that the angular momentum of electrons is quantized.

(2) Uses Einstein's photoelectric equation.

(3) Predicts continuous emission spectra for atoms.

(4) Predicts the same emission spectra for all types of atoms.

Scan or tap for the full solution

Q.46 In which of the following systems will the radius of the first orbit (n = 1) be minimum? [AIPMT 2003]

(1) doubly ionized lithium

(2) singly ionized helium

(3) deuterium atom

(4) hydrogen atom

Solution

Q.47 The energy of hydrogen atom in n^{th} orbit is E_n, then the energy in n^{th} orbit of singly ionised helium atom will be [AIPMT 2001]

(1) $4E_n$ (2) $E_n/4$ (3) $2E_n$ (4) $E_n/2$

Scan or tap for the full solution

Q.48 Maximum frequency of emission is obtained for the transition [AIPMT 2000]

(1) n = 2 to n = 1 (2) n = 6 to n = 2

(3) n = 1 to n = 2 (4) n = 2 to n = 6

Scan or tap for the full solution

Q.49 When an electron makes a transition from n = 4 to n = 2, then the emitted line spectrum will be [AIPMT 2000]

(1) first line of Lyman series

(2) second line of Balmer series

(3) first line of Balmer series

(4) second line of Paschen series

Solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	1	4	1	4	3	2	2	4	1	3
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	4	2	3	4	1	2	2	1	3	1	3
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	2	4	3	3	4	4	4	1	3	3	4
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	1	1	3	1	3	1	1	4	3	1	2
Ques.	45	46	47	48	49						
Ans.	1	1	1	1	2						

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