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EdLoop EAPCET

PHYSICS · EAPCET (EAMCET)

Atoms

Previous Year Questions with answers

141 questions · **131** papers · **2011–2026** · newest paper first

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What is in this PDF: every Atoms question we hold from past AP and TS EAPCET (called EAMCET until 2020 in Andhra Pradesh and 2023 in Telangana) papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

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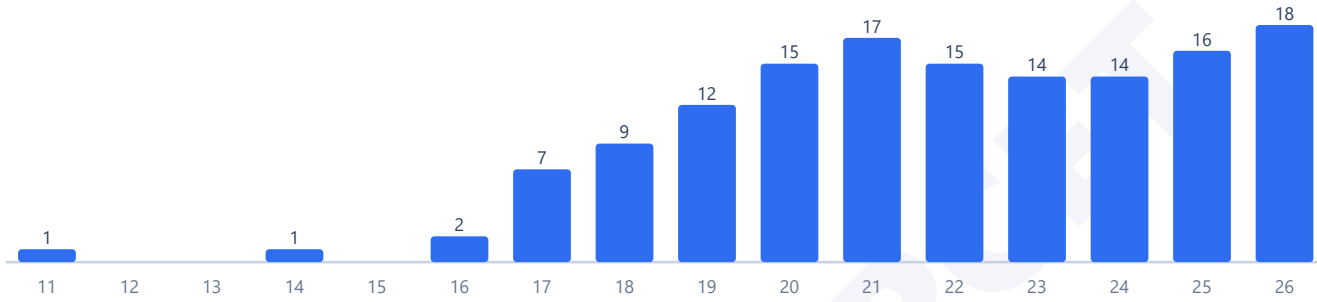
Chapter at a glance

2.5%	141	72 of 77	141 / 0
of Physics questions, 2022–2026	questions, 2011–2026	papers asked it, 2022–2026	MCQ / numerical, 2011–2026

Trend. Steady: 1 questions per paper in 2024–2026 against 0.9 in 2022–2023.

Questions per year



Counts are the questions we hold: 141 in 131 papers. No question in this chapter was found repeated across papers.

Most-asked topics in this chapter (2011–2026)

Bohr Model	130
Rutherford Model	6
X-rays	5

How often it comes up

Atomic structure and quantum spectral transitions form an essential section of modern physics in Class 12. In the papers we hold for AP and TS EAPCET between 2022 and 2026, Atoms contributed 77 questions across 77 papers. That yields an average of 1.0 question per paper, making up 2.5% of all physics questions in that recent window. Across all 149 papers in our collection from 2010 to 2026, Atoms brought 141 questions, holding an overall rate of 0.9 questions per paper and a 2.4% subject share. During the early span between 2010 and 2021, our database shows 64 questions across 72 papers (2.2% share). For the three most recent testing years from 2024 to 2026, the topic supplied 48 questions in 46 sittings, taking a 2.6% share. Measured against early papers, the share in the last three years is about the same, and compared with the 2022–2026 window it is likewise about the same.

State-wise tallies show balanced frequency across both regional administrations. AP EAPCET papers between 2022 and 2026 contributed 47 questions across 48 papers in our set, with 44 papers containing questions (1.0 per paper, 2.4% share). TS EAPCET contributed 30 questions across 29 papers in our set, with 28 papers featuring questions (1.0 per paper, 2.6% share). Atoms has appeared every year since 2022, though across all 77 recent papers in our collection, five papers missed it, meaning it did not feature in all 77 sittings. The chapter ranks 23rd of 28 physics chapters by question share between 2022 and 2026. The busiest single sitting in our collection was 2026, which produced 18 questions across 16 papers.

Most-asked topics

Questions concentrate across three syllabus areas:

- **Bohr Model**: This overwhelming majority topic brought 70 questions between 2022 and 2026, contributing to 130 questions across all years in our archive. It tests quantized orbital radii r_n ∝ n^2 / Z, orbital speeds v_n ∝ Z / n, total energy E_n = - thirteen point six Z^2 / n^2 eV, Rydberg formula for spectral series, and de Broglie's standing wave explanation of quantization.

- **Rutherford Model**: Recent examinations contributed 4 questions, out of 6 questions in the complete record. Key concepts cover alpha particle scattering, distance of closest approach, impact parameter b, and nuclear radius estimates.
- **X-rays**: A focused pool of 3 questions appeared in the recent five-year span, out of 5 questions overall. Questions examine continuous X-ray Duane-Hunt minimum cut-off wavelength λ_min = h c / (e V) and Moseley's law for characteristic K-alpha emissions.

What the questions look like

Hydrogen emission spectrum lines represent the single most common numerical question type. Students are given a transition line in the Lyman, Balmer, Paschen, or Brackett series, frequently specified through wave number or wavelength, and asked to deduce the principal quantum number of the initial or final orbit. Another recurring pattern compares the shortest wavelength (series limit where n_initial approaches infinity) with the longest wavelength (first line transition) of a given spectral series.

Bohr orbit kinematics also appears regularly. Questions ask for the ratio of orbital frequencies, magnetic dipole moments, or angular momenta between two specified energy levels. In scattering problems, examiners give the kinetic energy of an approaching alpha particle and ask for its distance of closest approach to a heavy gold nucleus, or test the geometric impact parameter formula where head-on collisions with zero impact parameter produce a rebound scattering angle of one hundred eighty degrees.

How to practise it

Start by mastering Bohr's quantization postulates and hydrogenic formulas. Quantized angular momentum is m v r = n h / (two π). For a single-electron atom of atomic number Z, orbital radius is r_n = r_one n^2 / Z, where first Bohr radius is approximately zero point five three angstroms. Orbital velocity is v_n = v_one Z / n. Total energy is E_n = - (thirteen point six Z^2 / n^2) eV, where kinetic energy K_n = - E_n and potential energy U_n = two E_n = - two K_n.

Next, study transition spectroscopy via the Rydberg equation: wave number ν_bar = 1 / λ = R_H Z^2 [1 / n_1^2 - 1 / n_2^2]. Memorize series lower levels: Lyman series terminates at n_1 = 1 (ultraviolet), Balmer series at n_1 = two (visible), Paschen series at n_1 = three (infrared), Brackett series at n_1 = four (infrared), and Pfund series at n_1 = five (infrared). When an electron cascades from level n down to ground state, the maximum number of distinct spectral lines emitted is N_lines = n (n - 1) / two.

Finally, review alpha scattering and X-ray limits. Distance of closest approach for an alpha particle of kinetic energy K fired at a target nucleus of charge Z e is d_zero = two Z e^2 / (four π ε_zero K). The Duane-Hunt threshold for continuous X-rays generated at accelerating potential V is λ_min = h c / (e V) = twelve thousand four hundred / V angstroms.

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Q1 AP EAPCET 2026 · 18 May · Shift 1 MCQ

An electron has an angular momentum of $90\hbar\ J-S$ while orbiting with a linear velocity of $\pi \times 10^5 ms^{-1}$ then the radius of the orbit is
(mass of electron = $9 \times 10^{-3} Kg$ and Planks Constant = 6.6×10^{-34} J s)

(A) $66 \times 10^{-15}\ m$
(B) $33 \times 10^{-15}\ m$
(C) $66 \times 10^{-10}\ m$
(D) $33 \times 10^{-8}\ m$

Answer: (D) $33 \times 10^{-8}\ m$ · The council's preliminary key

Q2 AP EAPCET 2026 · 18 May · Shift 2 MCQ

An electron is moving in an orbit of hydrogen atom in which there can be a maximum of six transitions. Another electron is moving in an another orbit of hydrogen atom in which there can be maximum of three transitions. The ratio of the velocity of electrons in these two orbits is

(A) 3/4
(B) 5/4
(C) 2/1
(D) 1/2

Answer: (A) 3/4 · The council's preliminary key

Q3 AP EAPCET 2026 · 15 May · Shift 1 MCQ

Suppose an electron is attracted towards the origin by a force $\frac{K}{r}$, where K is a constant and r is the distance of the electron from the origin. By applying Bohr model to this system, the radius of the nth orbit of the electron is found to be r_n, and the kinetic energy of the electron to be T_n, then which of the following is true?

(A) T_n is independent of n, $r_n \propto n$
(B) $T_n \propto \frac{1}{n}$, $r_n \propto n$
(C) $T_n \propto \frac{1}{n}$, $r_n \propto n^2$
(D) $T_n \propto \frac{1}{n^2}$, $r_n \propto n^2$

Answer: (A) T_n **is independent of n,** $r_n \propto n$ · The council's preliminary key

Q4 AP EAPCET 2026 · 15 May · Shift 2 MCQ

In hydrogen spectrum, the ratio of the shortest wavelength of Balmer series and longest wavelength of pfund series is

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(A) 36:125
(B) 11:225
(C) 11:125
(D) 36:11

Answer: (B) 11:225 · The council's preliminary key

Q5 AP EAPCET 2026 · 14 May · Shift 1 MCQ

The energy of an electron in Bohr's hydrogen atom is -3.4 eV. The angular momentum of the electron is

(A) $\frac{2h}{\pi}$
(B) $\frac{h}{2\pi}$
(C) $\frac{h}{\pi}$
(D) $\frac{h}{4\pi}$

Answer: (C) $\frac{h}{\pi}$ · The council's preliminary key

Q6 AP EAPCET 2026 · 14 May · Shift 2 MCQ

If the ratio of the time periods of the electrons revolving in the first and n^{th} orbits of Hydrogen atom is 1 : 64, then the angular momentum of the electron in the nth excited state of Hydrogen atom is (h – Planck's constant)

(A) $\frac{3.5\,h}{\pi}$
(B) $\frac{5\,h}{\pi}$
(C) $\frac{2.5\,h}{\pi}$
(D) $\frac{2\,h}{\pi}$

Answer: (C) $\frac{2.5\,h}{\pi}$ · The council's preliminary key

Q7 AP EAPCET 2026 · 13 May · Shift 1 MCQ

The atomic number (Z) of a hydrogen like atom whose shortest wavelength of Brackett Series is same as the shortest wavelength of Balmer series of hydrogen atom is

(A) $Z = 1$
(B) $Z = 2$
(C) $Z = 3$
(D) $Z = 4$

Answer: (B) $Z = 2$ · The council's preliminary key

Q8 AP EAPCET 2026 · 13 May · Shift 2 MCQ

The minimum frequency of light which can ionize a hydrogen atom is approximately

(A) $3.3 \times 10^{15}\ Hz$
(B) $5 \times 10^{15}\ Hz$
(C) $91.1\ Hz$
(D) $30.5\ Hz$

Answer: (A) $3.3 \times 10^{15}\ Hz$ · The council's preliminary key

Q9 AP EAPCET 2026 · 12 May · Shift 1 MCQ

The wave number of a spectral line in Brackett series of hydrogen atom is $\frac{9}{400}$R.

The electron has transmitted from the orbit having quantum number

(A) 5
(B) 6
(C) 4
(D) 7

Answer: (A) 5 · The council's preliminary key

Q10 AP EAPCET 2026 · 12 May · Shift 1 MCQ

Find the impact parameter of a particle of energy 10 MeV while approaching the gold nucleus, if scattered with 60°?
(Charge of electron = 1.6×10^{-19} C, Atomic Number of gold = 79)

(A) $1.3\sqrt{3}$ fermi
(B) $11.3\sqrt{3}$ fermi
(C) $113\sqrt{3}$ fermi
(D) $133\sqrt{3}$ fermi

Answer: (B) $11.3\sqrt{3}$ fermi · The council's preliminary key

Q11 AP EAPCET 2026 · 12 May · Shift 2 MCQ

In Rutherford α scattering experiment when a particle approaches with an impact parameter zero, its angle of scattering is

(A) 0°
(B) $\frac{\pi}{2}$
(C) π
(D) $\frac{2\pi}{3}$

Answer: (C) π · The council's preliminary key

Q12 TS EAPCET 2026 · 11 May · Shift 1 MCQ

The ratio of the wavelengths of first and third spectral lines of Lyman series of hydrogen atom is

(A) $5 : 4$
(B) $9 : 4$
(C) $7 : 3$
(D) $16 : 3$

Answer: (A) $5 : 4$ · The council's preliminary key

Q13 TS EAPCET 2026 · 11 May · Shift 2 MCQ

If the time period of an electron in the ground state of hydrogen atom is 1.5×10^{-16} s, then the time period of the electron in the third excited state of hydrogen atom is

(A) 2.4×10^{-15} s
(B) 9.6×10^{-15} s
(C) 6.4×10^{-15} s
(D) 4.8×10^{-15} s

Answer: (B) 9.6×10^{-15} s · The council's preliminary key

Q14 TS EAPCET 2026 · 10 May · Shift 1 MCQ

When gaseous hydrogen at room temperature is bombarded with 12.75 eV electrons, the maximum possible number of spectral lines emitted is

(A) 3
(B) 4
(C) 1
(D) 6

Answer: (D) 6 · The council's preliminary key

Q15 TS EAPCET 2026 · 10 May · Shift 2 MCQ

In terms of Planck's constant (h), permittivity of free space (ε_0), mass of the electron (m) and charge of the electron (e), the de Broglie wavelength associated with the electron in the second orbit of hydrogen atom is

(A) $\frac{h^2\varepsilon_0}{2me^2}$
(B) $\frac{h^2\varepsilon_0}{4me^2}$
(C) $\frac{2h^2\varepsilon_0}{me^2}$
(D) $\frac{4h^2\varepsilon_0}{me^2}$

Answer: (D) $\frac{4h^2\varepsilon_0}{me^2}$ · The council's preliminary key

Q16 TS EAPCET 2026 · 9 May · Shift 1 MCQ

If the 9546 Å wavelength spectral line in hydrogen spectrum is due to the transition of an electron from a higher orbit to n^{th} lower orbit, then the value of n is

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

Answer: (C) 3 · The council's preliminary key

Q17 TS EAPCET 2026 · 9 May · Shift 1 MCQ

The substance which has an energy band gap equal to the energy of the spectral line corresponding to the shortest wavelength of Paschen series of the hydrogen spectrum is

(A) Conductor
(B) Insulator
(C) Semiconductor
(D) Superconductor

Answer: (C) Semiconductor · The council's preliminary key

Q18 TS EAPCET 2026 · 9 May · Shift 2 MCQ

If the wavelength of a spectral line in the Balmer series of hydrogen spectrum is $\frac{7.2}{R}$, then the ratio of the radii of the higher and lower orbits between which the transition of electron takes place is
(R - Rydberg constant)

(A) 9:4
(B) 4:1
(C) 25:4
(D) 8:1

Answer: (A) 9:4 · The council's preliminary key

Q19 AP EAPCET 2025 · 27 May · Shift 1 MCQ

The ratio of the shortest wavelengths of Bracket and Balmer series of hydrogen atom is

(A) $2:1$
(B) $3:2$
(C) $4:1$
(D) $6:5$

Answer: (C) $4:1$ · The council's preliminary key

Q20 AP EAPCET 2025 · 26 May · Shift 1 MCQ

The minimum wavelength of X-rays produced by 20 kV electrons is nearly

(A) 0.62 Å
(B) 1.8 Å
(C) 3.2 Å
(D) 6.5 Å

Answer: (A) 0.62 Å · The council's preliminary key

Q21 AP EAPCET 2025 · 26 May · Shift 2 MCQ

The ratio of the time periods of the revolution of the electrons in the second and third excited states of hydrogen atom is

(A) $9:16$
(B) $27:64$
(C) $4:9$
(D) $8:27$

Answer: (B) $27:64$ · The council's preliminary key

Q22 AP EAPCET 2025 · 24 May · Shift 1 MCQ

The ratio of energies of photons produced due to transition of an electron in hydrogen atom from second energy level to first energy level and fifth energy level to second energy level is

(A) $2:1$
(B) $1:4$
(C) $3:2$
(D) $25:7$

Answer: (D) $25:7$ · The council's preliminary key

Q23 AP EAPCET 2025 · 23 May · Shift 1 MCQ

Of the following, Bohr's atomic model is applicable to

(A) explain relative intensities of spectral lines emitted by hydrogen atoms
(B) helium atom
(C) lithium atom
(D) hydrogenic atoms

Answer: (D) hydrogenic atoms · The council's preliminary key

Q24 AP EAPCET 2025 · 23 May · Shift 2 MCQ

The ratio of the wavelengths of the spectral lines emitted due to transitions $3 \rightarrow 2$ and $2 \rightarrow 1$ orbits in the hydrogen atom is

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(A) $3 : 1$
(B) $9 : 17$
(C) $27 : 5$
(D) $25 : 9$

Answer: (C) $27 : 5$ · The council's preliminary key

Q25 AP EAPCET 2025 · 22 May · Shift 1 MCQ

The difference between the frequencies of second and first Paschen lines of hydrogen atom is (R - Rydberg constant and c - speed of light in vacuum)

(A) $\frac{9Rc}{16}$
(B) $\frac{16Rc}{25}$
(C) $\frac{9Rc}{400}$
(D) $\frac{3Rc}{200}$

Answer: (C) $\frac{9Rc}{400}$ · The council's preliminary key

Q26 AP EAPCET 2025 · 22 May · Shift 2 MCQ

The ratio of the wavelengths of the first Lyman line and the second Balmer line of hydrogen atom is

(A) $3 : 4$
(B) $1 : 4$
(C) $2 : 3$
(D) $1 : 3$

Answer: (B) $1 : 4$ · The council's preliminary key

Q27 AP EAPCET 2025 · 21 May · Shift 2 MCQ

The difference between the frequencies of the first and second Lyman lines of hydrogen atom is (R - Rydberg constant and c - speed of light in vacuum)

(A) $\frac{9Rc}{28}$
(B) $\frac{7Rc}{12}$
(C) $\frac{3Rc}{8}$
(D) $\frac{5Rc}{36}$

Answer: (D) $\frac{5Rc}{36}$ · The council's preliminary key

Q28 TS EAPCET 2025 · 4 May · Shift 1 MCQ

If the total energy of an electron in an orbit is positive, then

(A) electron will revolve in a circular orbit
(B) electron will revolve in an elliptical orbit
(C) electron will not follow a closed orbit
(D) electron will fall into the nucleus

Answer: (C) electron will not follow a closed orbit · The council's preliminary key

Q29 TS EAPCET 2025 · 4 May · Shift 2 MCQ

The maximum wavelength of incident radiation required to ionize a hydrogen atom in its ground state is nearly

(A) 912 nm
(B) 1215 Å
(C) 912 Å
(D) 1215 nm

Answer: (C) 912 Å · The council's preliminary key

Q30 TS EAPCET 2025 · 3 May · Shift 1 MCQ

20 kV electrons can produce X-rays with a minimum wavelength of

(A) 0.248 Å
(B) 0.41 Å
(C) 0.099 nm
(D) 0.062 nm

Answer: (D) 0.062 nm · The council's preliminary key

Q31 TS EAPCET 2025 · 3 May · Shift 1 MCQ

The ratio of wavelengths of second line in Balmer series and the first line in Lyman series of hydrogen atom is

(A) $2:1$
(B) $9:4$
(C) $4:1$
(D) $3:2$

Answer: (C) $4:1$ · The council's preliminary key

Q32 TS EAPCET 2025 · 3 May · Shift 2 MCQ

The potential energy of an electron in an orbit of hydrogen atom is -6.8 eV. The de Broglie wavelength of the electron in this orbit is

(r_o is Bohr radius)

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(A) $2\pi r_o$

(B) $4\pi r_o$

(C) πr_o

(D) $3\pi r_o$

Answer: (B) $4\pi r_o$ · The council's preliminary key

Q33 TS EAPCET 2025 · 2 May · Shift 1 MCQ

If the difference in the frequencies of the first and second lines of Lyman series of hydrogen atom is f, then the difference in frequencies of the first and second lines of Balmer series of hydrogen atom is

(A) $\frac{3f}{4}$

(B) f

(C) $\frac{7f}{20}$

(D) $\frac{9f}{16}$

Answer: (C) $\frac{7f}{20}$ · The council's preliminary key

Q34 TS EAPCET 2025 · 2 May · Shift 2 MCQ

The ratio of the kinetic energies of the electrons in the third and fourth excited states of hydrogen atom is

(A) $4:3$

(B) $16:9$

(C) $25:16$

(D) $5:4$

Answer: (C) $25:16$ · The council's preliminary key

Q35 AP EAPCET 2024 · 23 May · Shift 1 MCQ

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 & λ_3 are the wavelengths of a photon corresponding to the transitions shown, then

(see the figure above)

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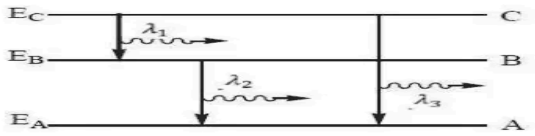
Energy levels A, B and C of a certain atom corresponding to increasing values of energy i.e., $E_A < E_B < E_C$. If λ_1, λ_2 & λ_3 are the wavelengths of a photon corresponding to the transitions shown, then

ఒక పరమాణువులో A, B మరియు C అనే శక్తిస్థాయిలు క్రమంగా పెరిగే శక్తి విలువను సూచిస్తాయి. అనగా $E_A < E_B < E_C$. λ_1, λ_2 మరియు λ_3 అనేవి పటంలో చూపిన సంక్రమణాలకు సంబంధించిన ఫోటాన్ల తరంగదైర్ఘ్యాలైతే, వాటి మధ్య సంబంధము



Options :

1. $\lambda_3 = \lambda_1 + \lambda_2$
2. $\lambda_3 = \frac{(\lambda_1 + \lambda_2)}{\lambda_1 \lambda_2}$
3. $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$
4. $\lambda_3 = \frac{\lambda_1 \lambda_2}{(\lambda_1 + \lambda_2)}$

(A) $\lambda_3 = \lambda_1 + \lambda_2$

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

(C) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

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

Answer: (D) $\lambda_3 = \frac{\lambda_1 \lambda_2}{(\lambda_1 + \lambda_2)}$ · The council's preliminary key

Q36 AP EAPCET 2024 · 22 May · Shift 1 MCQ

The ratio of minimum wave length of Balmer series to maximum wavelength in Brackett series in hydrogen spectrum is

(A) $25 : 16$

(B) $4 : 36$

(C) $9 : 100$

(D) $100 : 9$

Answer: (C) $9 : 100$ · The council's preliminary key

Q37 AP EAPCET 2024 · 22 May · Shift 2 MCQ

The principle quantum number 'n' corresponding to the exited state of He^+ ion, if on transition to the ground state two photons in succession with wavelength 1026 A° and 304 A° are emitted

(R = 1.097 × 10^7 m^{-1})

(A) 2
(B) 3
(C) 6
(D) 4

Answer: (C) 6 · The council's preliminary key

Q38 AP EAPCET 2024 · 21 May · Shift 1 MCQ

The ground state energy of hydrogen atom is -13.6 eV. The potential energy of the electron in this state is

(A) 27.2 eV
(B) -27.2 eV
(C) -13.6 eV
(D) 13.6 eV

Answer: (B) -27.2 eV · The council's preliminary key

Q39 AP EAPCET 2024 · 21 May · Shift 2 MCQ

The electrostatic potential energy of the electron in an orbit of hydrogen is -6.8 eV. The speed of the electron in this orbit is (C is speed of light in vacuum)

(A) $\frac{C}{137}$
(B) $\frac{C}{274}$
(C) $\frac{2C}{137}$
(D) $\frac{3C}{137}$

Answer: (B) $\frac{C}{274}$ · The council's preliminary key

Q40 AP EAPCET 2024 · 20 May · Shift 1 MCQ

μ – meson of charge 'e', mass 208 me moves in a circular orbit around a heavy nucleus having charge +3e. The quantum state 'n' for which the radius of the orbit is same as that of the first Bohr orbit for hydrogen atom is [approximately]

(A) $n \approx 20$
(B) $n \approx 25$
(C) $n \approx 28$
(D) $n \approx 29$

Answer: (B) $n \approx 25$ · The council's preliminary key

Q41 AP EAPCET 2024 · 20 May · Shift 2 MCQ

The speed of the electron is a hydrogen atom in the $n = 3$ level is

(Plank constant = 6.6×10^{-34} Js)

(A) $6.2 \times 10^5\ \mathrm{ms}^{-1}$
(B) $3.7 \times 10^5\ \mathrm{ms}^{-1}$
(C) $7.3 \times 10^5\ \mathrm{ms}^{-1}$
(D) $1.6 \times 10^5\ \mathrm{ms}^{-1}$

Answer: (C) $7.3 \times 10^5\ \mathrm{ms}^{-1}$ · The council's preliminary key

Q42 AP EAPCET 2024 · 19 May · Shift 2 MCQ

A hydrogen atom falls from n^{th} higher energy orbit to first energy orbit (n = 1). The energy released is equal to 12.75 ev. The nth orbit is

(A) $n = 4$
(B) $n = 3$
(C) $n = 6$
(D) $n = 5$

Answer: (A) $n = 4$ · The council's preliminary key

Q43 AP EAPCET 2024 · 18 May · Shift 1 MCQ

If the bonding energy of the electron in a hydrogen atom is 13.6 eV, then energy required to remove electron from first excited state of Li^{2+} is

(A) 122.4 eV
(B) 3.4 eV
(C) 13.6 eV
(D) 30.6 eV

Answer: (D) 30.6 eV · The council's preliminary key

Q44 TS EAPCET 2024 · 11 May · Shift 1 MCQ

In hydrogen atom, the frequency of the photon emitted when an electron jumps from second orbit to first orbit is 'f'. The frequency of the photon emitted when an electron jumps from third excited state to first excited state is

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(A) $\frac{f}{2}$
(B) $\frac{f}{4}$
(C) $\frac{f}{8}$
(D) f

Answer: (B) $\frac{f}{4}$ · The council's preliminary key

Q45 TS EAPCET 2024 · 10 May · Shift 1 MCQ

The ratio of the centripetal accelerations of the electron in two successive orbits of hydrogen is $81:16$. Due to a transition between these two states, the angular momentum of the electron changes by (h – Planck's constant)

(A) $\frac{h}{3\pi}$
(B) $\frac{3h}{\pi}$
(C) $\frac{h}{2\pi}$
(D) $\frac{2h}{\pi}$

Answer: (C) $\frac{h}{2\pi}$ · The council's preliminary key

Q46 TS EAPCET 2024 · 10 May · Shift 2 MCQ

The ground state energy of hydrogen atom is -13.6 eV. The potential energy of the electron in the first excited state of hydrogen is

(A) -6.8 eV
(B) -3.4 eV
(C) -13.6 eV
(D) -27.2 eV

Answer: (A) -6.8 eV · The council's preliminary key

Q47 TS EAPCET 2024 · 9 May · Shift 1 MCQ

At room temperature, gaseous hydrogen is bombarded with a beam of electrons of 13.6 eV energy. The series to which the emitted spectral line belongs to

(A) Lyman series
(B) Balmer series
(C) Paschen series
(D) Pfund series

Answer: (A) Lyman series · The council's preliminary key

Q48 TS EAPCET 2024 · 9 May · Shift 2 MCQ

The ratio of the wavelengths of radiation emitted when an electron in the hydrogen atom jumps from 4th orbit to 2nd orbit and from 3rd orbit to 2nd orbit is

(A) $27 : 25$
(B) $20 : 25$
(C) $20 : 27$
(D) $25 : 27$

Answer: (C) $20 : 27$ · The council's preliminary key

Q49 AP EAPCET 2023 · 19 May · Shift 1 MCQ

The minimum excitation energy of an electron revolving in the first orbit of hydrogen is

(A) 3.4 eV
(B) 8.5 eV
(C) 10.2 eV
(D) 13.6 eV

Answer: (C) 10.2 eV · The council's preliminary key

Q50 AP EAPCET 2023 · 18 May · Shift 2 MCQ

In hydrogen atom, if an electron in the orbit with principal quantum number 'n' jumps to the first excited state, the wavelength of the emitted photon is 'λ'. Then the value of n is

(R – Rydberg constant)

(A) $\sqrt{\frac{4\lambda R}{\lambda R+4}}$
(B) $\sqrt{\frac{4\lambda R}{\lambda R-4}}$
(C) $\sqrt{\frac{\lambda R-4}{4\lambda R}}$
(D) $\sqrt{\frac{\lambda R+4}{4\lambda R}}$

Answer: (B) $\sqrt{\frac{4\lambda R}{\lambda R-4}}$ · The council's preliminary key

Q51 AP EAPCET 2023 · 17 May · Shift 1 MCQ

The total energy of an electron in an orbit of hydrogen atom is E. The potential energy of the electron in the same orbit is

(A) E
(B) $\frac{E}{2}$
(C) $2E$
(D) $3E$

Answer: (C) $2E$ · The council's preliminary key

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Q52 AP EAPCET 2023 · 17 May · Shift 2 MCQ

In hydrogen spectrum, the shortest wavelengths of Lyman and Balmer series are λ_1 and λ_2 respectively. The Rydberg constant of hydrogen is

(A) $\frac{\lambda_1+\lambda_2}{2}$
(B) $\frac{4(\lambda_2-\lambda_1)}{3\lambda_1\lambda_2}$
(C) $\frac{3(\lambda_2-\lambda_1)}{4\lambda_1\lambda_2}$
(D) $\frac{2(\lambda_2-\lambda_1)}{3\lambda_1\lambda_2}$

Answer: (B) $\frac{4(\lambda_2-\lambda_1)}{3\lambda_1\lambda_2}$ · The council's preliminary key

Q53 AP EAPCET 2023 · 16 May · Shift 1 MCQ

The distance of closest approach of an alpha particle to a nucleus when the alpha particle moves towards the nucleus with linear momentum P is d. The distance of closest approach of alpha particle to nucleus, if the linear momentum of the alpha particle is 1.5 P

(A) $\frac{2d}{3}$
(B) $\frac{3d}{2}$
(C) $\frac{4d}{9}$
(D) $\frac{9d}{4}$

Answer: (C) $\frac{4d}{9}$ · The council's preliminary key

Q54 AP EAPCET 2023 · 16 May · Shift 2 MCQ

When a metal target is bombarded with high energy electrons, the electromagnetic waves generated are

(A) infrared waves
(B) microwaves
(C) X-rays
(D) gamma rays

Answer: (C) X-rays · The council's preliminary key

Q55 AP EAPCET 2023 · 16 May · Shift 2 MCQ

An alpha particle of energy K MeV is moving towards a nucleus of atomic number Z. The distance of closest approach of the alpha particle to the nucleus in metres is

(A) $7.2 \times 10^{-16} \frac{Z}{K}$
(B) $3.84 \times 10^{-16} \frac{Z}{K}$
(C) $14.4 \times 10^{-16} \frac{Z}{K}$
(D) $28.8 \times 10^{-16} \frac{Z}{K}$

Answer: (D) $28.8 \times 10^{-16} \frac{Z}{K}$ · The council's preliminary key

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Q56 AP EAPCET 2023 · 15 May · Shift 1 MCQ

The transition of an electron in hydrogen atom that emits a photon whose wavelength lies in the ultraviolet region of the electromagnetic spectrum is

(A) $5 \rightarrow 4$
(B) $4 \rightarrow 3$
(C) $3 \rightarrow 2$
(D) $2 \rightarrow 1$

Answer: (D) $2 \rightarrow 1$ · The council's preliminary key

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Q57 AP EAPCET 2023 · 15 May · Shift 2 MCQ

The centripetal acceleration 'a' of an electron in an orbit of hydrogen and the principal quantum number 'n' of the orbit are related by

(A) $a \propto n^2$
(B) $a \propto \frac{1}{n^2}$
(C) $a \propto n^4$
(D) $a \propto \frac{1}{n^4}$

Answer: (D) $a \propto \frac{1}{n^4}$ · The council's preliminary key

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Q58 TS EAMCET 2023 · 14 May · Shift 1 MCQ

In a hypothetical Bohr hydrogen atom, if the mass of the electron is doubled then the energy of the electron in the first orbit is

(A) $-27.2\ \text{eV}$
(B) $-13.6\ \text{eV}$
(C) $-6.8\ \text{eV}$
(D) $-3.4\ \text{eV}$

Answer: (A) $-27.2\ \text{eV}$ · The council's preliminary key

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Q59 TS EAMCET 2023 · 14 May · Shift 2 MCQ

The ratio of longest wavelengths of the spectral lines in the Lyman and Balmer series of hydrogen spectrum is

(A) $\frac{3}{23}$
(B) $\frac{5}{27}$
(C) $\frac{7}{29}$
(D) $\frac{9}{31}$

Answer: (B) $\frac{5}{27}$ · The council's preliminary key

Q60 TS EAMCET 2023 · 13 May · Shift 1 MCQ

In hydrogen spectrum, the shortest and longest wavelengths of Balmer series are λ_1 and λ_2 respectively. The Rydberg constant of hydrogen is

(A) $\frac{1}{\lambda_1} - \frac{9}{\lambda_2}$
(B) $\frac{4}{\lambda_1} - \frac{9}{\lambda_2}$
(C) $\frac{9}{\lambda_1} - \frac{9}{\lambda_2}$
(D) $\frac{9}{\lambda_1} - \frac{4}{\lambda_2}$

Answer: (C) $\frac{9}{\lambda_1} - \frac{9}{\lambda_2}$ · The council's preliminary key

Q61 TS EAMCET 2023 · 12 May · Shift 1 MCQ

If an electron is moving in the 4th orbit of the hydrogen atom then the angular momentum of the electron in SI units is

(A) $\frac{h}{\pi}$
(B) $\frac{2h}{\pi}$
(C) $\frac{4h}{\pi}$
(D) $\frac{h}{2\pi}$

Answer: (B) $\frac{2h}{\pi}$ · The council's preliminary key

Q62 TS EAMCET 2023 · 12 May · Shift 2 MCQ

The ratio of the energies of the electron in the hydrogen atom in the first and second excited states is

(A) $9:4$
(B) $4:1$
(C) $8:1$
(D) $1:8$

Answer: (A) $9:4$ · The council's preliminary key

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Q63 TS EAMCET 2022 · 20 Jul · Shift 1 MCQ

The energy of an electron in the fourth excited state of the hydrogen atom is

(A) $-$ 0.85 eV
(B) -1.70 eV
(C) 0
(D) $-$ 0.425 eV

Answer: (A) $-$ 0.85 eV · The council's preliminary key

Q64 TS EAMCET 2022 · 20 Jul · Shift 2 MCQ

The shortest wavelength in Balmer series of hydrogen atom spectrum is approximately equal to (use $R_H = 1.097 \times 10^7\ \mathrm{m}^{-1}$)

(A) $3646\ \text{Å}$
(B) $912\ \text{Å}$
(C) $364.6\ \text{Å}$
(D) $91.2\ \text{Å}$

Answer: (A) $3646\ \text{Å}$ · The council's preliminary key

Q65 TS EAMCET 2022 · 19 Jul · Shift 1 MCQ

The difference in the wavelength between the maximum and minimum of Balmer series [Use $\mathrm{R_H} = 1 \times 10^7\ \mathrm{m}^{-1}$]

(A) 1600 Å
(B) 3200 Å
(C) 4000 Å
(D) 4800 Å

Answer: (B) $3200\ \text{Å}$ · The council's preliminary key

Q66 TS EAMCET 2022 · 19 Jul · Shift 2 MCQ

Considering the Bohr's model of Hydrogen atom, the ratio of velocities of electrons orbiting in the 4th orbit to that in the 9th orbit is

(A) $9 : 4$
(B) $3 : 2$
(C) $2 : 3$
(D) $4 : 9$

Answer: (A) $9 : 4$ · The council's preliminary key

Q67 TS EAMCET 2022 · 18 Jul · Shift 1 MCQ

The light emitted in the transition n = 3 to n = 2 (where n is the principal quantum number of the state) in hydrogen is called H_α-light. Find the maximum work function that a metal can have so that H_α-light can emit photoelectrons from it.

(A) $1.5\ \text{eV}$
(B) $2.89\ \text{eV}$
(C) $1.89\ \text{eV}$
(D) $3.5\ \text{eV}$

Answer: (C) $1.89\ \text{eV}$ · The council's preliminary key

Q68 TS EAMCET 2022 · 18 Jul · Shift 2 MCQ

If the series limit frequency of Balmer series is ν_B, then the series limit frequency of the Brackett series is

(A) $\frac{4\nu_B}{25}$
(B) $\frac{\nu_B}{9}$
(C) $\frac{\nu_B}{4}$
(D) $\frac{9\nu_B}{4}$

Answer: (C) $\frac{\nu_B}{4}$ · The council's preliminary key

Q69 AP EAPCET 2022 · 8 Jul · Shift 1 MCQ

As the quantum number increases, the difference in energy between consecutive energy levels

(A) Remains the same
(B) Increases
(C) Decreases
(D) Sometimes increases and sometimes decreases

Answer: (C) Decreases · The council's preliminary key

Q70 AP EAPCET 2022 · 8 Jul · Shift 2 MCQ

The following parameter is same for all hydrogen like atoms and ions in their ground state.

(A) Radius of the orbit
(B) Speed of the electron
(C) Energy of the atom
(D) Orbital angular momentum of the electron

Answer: (D) Orbital angular momentum of the electron · The council's preliminary key

Q71 AP EAPCET 2022 · 6 Jul · Shift 1 MCQ

The shortest wavelength in the Paschen series of the Hydrogen spectrum is
Rydberg constant of hydrogen $= 1.097 \times 10^{7}\ \mathrm{m}^{-1}$

(A) 91.2 nm
(B) 364.6 nm
(C) 820.4 nm
(D) 2278.9 nm

Answer: (C) 820.4 nm · The council's preliminary key

Q72 AP EAPCET 2022 · 6 Jul · Shift 2 MCQ

Statement (A): As one considers orbits with higher values of n in hydrogen atom, the electric potential energy of the atom increases.
Statement (B): In Thomson's model, an atom is a spherical cloud of positive charges with electrons embedded in it.
Statement (C): The orbital picture in Bohr's model of the hydrogen atom was consistent with the uncertainty principle.

(A) A, B and C are true
(B) A, B true, but C false
(C) B, C true, but A false
(D) A, C true but B false

Answer: (B) A, B true, but C false · The council's preliminary key

Q73 AP EAPCET 2022 · 5 Jul · Shift 1 MCQ

An electron in the hydrogen atom excites from 2nd orbit to 4th orbit then the change in angular momentum of the electron is (Planck's constant $h = 6.64 \times 10^{-34}$ J-s)

(A) 2.11×10^{-34} J-s
(B) 1.05×10^{-34} J-s
(C) 0.57×10^{-34} J-s
(D) 4.22×10^{-34} J-s

Answer: (A) 2.11×10^{-34} J-s · The council's preliminary key

Q74 AP EAPCET 2022 · 5 Jul · Shift 2 MCQ

The ratio of radii of 3rd and 6th Bohr's orbit in a hydrogen atom is

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(A) 0.25
(B) 0.33
(C) 4
(D) 3

Answer: (A) 0.25 · The council's preliminary key

Q75 AP EAPCET 2022 · 5 Jul · Shift 2 MCQ

The frequency of the light emitted when an electron comes down from n = 4 to n = 2 level in hydrogen atom is $\frac{3}{7}$ times of the following transition of the Li^{2+} ion

(A) 4 to 3
(B) 4 to 1
(C) 3 to 2
(D) 5 to 3

Answer: (A) 4 to 3 · The council's preliminary key

Q76 AP EAPCET 2022 · 4 Jul · Shift 1 MCQ

Energy of a stationary electron in the hydrogen atom is $E = -\frac{13.6}{n^2}$ eV then the energies required to excite the electron in hydrogen atom to (a) its second excited state and (b) ionized state respectively

(A) (a) ~10 eV, (b) 13.6 eV
(B) (a) ~ 12 eV, (b) 13.6 eV
(C) (a) ~ 12 eV, (b) 10.6 eV
(D) (a) ~ 8 eV, (b) 13.6 eV

Answer: (B) (a) ~ 12 eV, (b) 13.6 eV · The council's preliminary key

Q77 AP EAPCET 2022 · 4 Jul · Shift 2 MCQ

A hydrogen atom at the ground level absorbs a photon and is excited to n = 4 level. The potential energy of the electron in the excited state is

(A) -0.85 eV
(B) $+0.85$ eV
(C) -1.7 eV
(D) $+1.7$ eV

Answer: (C) -1.7 eV · The council's preliminary key

Q78 AP EAPCET 2021 · 5 Oct · Shift 1 MCQ

A hydrogen like atom emits radiation of frequency $2.7 \times 10^{15}\ Hz$ when it undergoes a transition from $n = 2$ to $n = 1$. For the same atom, find the frequency of the radiation emitted when a transition

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occurs from $n = 3$ to $n = 1$.

(A) $3.2 \times 10^{15}\ Hz$

(B) $1.8 \times 10^{15}\ Hz$

(C) $6.9 \times 10^{15}\ Hz$

(D) $4.7 \times 10^{15}\ Hz$

Answer: (A) $3.2 \times 10^{15}\ Hz$ · The council's preliminary key

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Q79 AP EAPCET 2021 · 25 Aug · Shift 1 MCQ

Assertion (A): The impact parameter for scattering of α- particles by 180° is zero.
Reason (R): Zero impact parameter means that the α-particles tend to hit the center of the nucleus.

(A) Both A and R are true and R is a correct explanation for A

(B) Both A and R are true but R is not a correct explanation for A

(C) A is true, R is false

(D) A is false, R is true

Answer: (A) Both A and R are true and R is a correct explanation for A · The council's preliminary key

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Q80 AP EAPCET 2021 · 25 Aug · Shift 2 MCQ

The ratio of speed of electrons in the first excited state of hydrogen atom to the speed of light in vacuum is _____. Given, Planck's constant = $6.625 \times 10^{-34}\,\mathrm{J.s}$ and permittivity of free space is $8.85 \times 10^{-12}\,\mathrm{F.m^{-1}}$

(A) 5×10^{-3}

(B) 7.3×10^{-3}

(C) 3.6×10^{-3}

(D) 36.5×10^{-3}

Answer: (C) 3.6×10^{-3} · The council's preliminary key

Q81 AP EAPCET 2021 · 24 Aug · Shift 1 MCQ

When electron in hydrogen atom jumps to the inner most orbit, the radiation emitted belongs to which one of the following series?

(A) Paschen

(B) Balmer

(C) Lyman

(D) Bracket

Answer: (C) Lyman · The council's preliminary key

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Q82 AP EAPCET 2021 · 24 Aug · Shift 2 MCQ

Which of the following is the property of Rydberg constant?

(A) It is universal constant
(B) It is same for all hydrogen like atom
(C) It depends on the atomic number of the atom
(D) It depends on the mass number of the atom

Options (1) or (2) were accepted. More than one answer was accepted. · The council's preliminary key

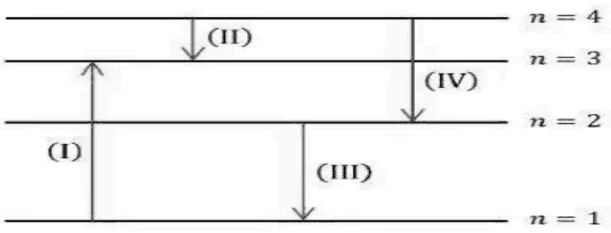
Q83 AP EAPCET 2021 · 23 Aug · Shift 1 MCQ

The diagram shows different transitions across the energy levels for an electron in a certain atom. Among these, which transition represents the emission of a photon with the most energy?
(see the figure above)

Mandatory : No

The diagram shows different transitions across the energy levels for an electron in a certain atom. Among these, which transition represents the emission of a photon with the most energy?

పటము నిర్దిష్ట పరమాణువులోని ఎలక్ట్రాను శక్తి స్థాయిలను చూపును. అత్యధిక శక్తితో వెలువడే ఫోటానును చూపించే సంక్రమణం ఏది?



Options :

1. (II)
2. (I)
3. (IV)
4. (III)

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(A) (II)
(B) (I)
(C) (IV)
(D) (III)

Answer: (D) (III) · The council's preliminary key

Q84 AP EAPCET 2021 · 23 Aug · Shift 2 MCQ

Ionization potential of hydrogen atom is 13.6 eV. When hydrogen atoms in ground state are excited by a supply of 12.1 eV, the number of spectral lines emitted by hydrogen atoms according to Bohr's theory is _____

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

Answer: (B) 3 · The council's preliminary key

Q85 AP EAPCET 2021 · 20 Aug · Shift 1 MCQ

The angular momentum of the orbital electron is integral multiple of:

(A) h
(B) $2\pi h$
(C) $\frac{h}{2\pi}$
(D) $3\pi h$

Answer: (C) $\frac{h}{2\pi}$ · The council's preliminary key

Q86 AP EAPCET 2021 · 20 Aug · Shift 2 MCQ

The shortest wavelength of X-rays emitted from an X-ray tube depends upon _____

(A) Nature of the gas in the tube
(B) Voltage applied to tube
(C) Current in the tube
(D) Nature of target of the tube

Answer: (B) Voltage applied to tube · The council's preliminary key

Q87 AP EAPCET 2021 · 20 Aug · Shift 2 MCQ

The wavelength of the first spectral line of the Lyman series of hydrogen spectrum is

(A) 912 Å
(B) 1215 Å
(C) 1512 Å
(D) 6563 Å

Answer: (B) 1215 Å · The council's preliminary key

Q88 AP EAPCET 2021 · 19 Aug · Shift 1 MCQ

Potential energy between a proton and an electron is given by $U = \frac{Ke^2}{3R^3}$, then radius of Bohr's orbit can be given by _____

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(A) $\frac{Ke^2m}{h^2}$
(B) $\frac{6\pi^3Ke^2m}{n^3h^2}$
(C) $\frac{2\pi}{n} \cdot \frac{Ke^2m}{h^2}$
(D) $\frac{4\pi^2Ke^2m}{n^2h^2}$

Answer: (D) $\frac{4\pi^2Ke^2m}{n^2h^2}$ · The council's preliminary key

Q89 AP EAPCET 2021 · 19 Aug · Shift 2 MCQ

The ionization potential of hydrogen atom is $13.6\ \mathrm{V}$. How much energy need to be supplied to ionize the hydrogen atom in the first excited state.

(A) $13.6\ \mathrm{eV}$
(B) $27.2\ \mathrm{eV}$
(C) $3.4\ \mathrm{eV}$
(D) $6.8\ \mathrm{eV}$

Answer: (C) $3.4\ \mathrm{eV}$ · The council's preliminary key

Q90 TS EAMCET 2021 · 6 Aug · Shift 1 MCQ

A mono chromatic radiation of wave length λ is incident on a hydrogen sample in ground state the sample subsequently emits radiation of six different wave lengths, then the value of λ is [Use ch = 1242 ev-m]

(A) 80 nm
(B) 85.5 nm
(C) 97.4 nm
(D) 100.2 nm

Answer: (C) 97.4 nm · The council's preliminary key

Q91 TS EAMCET 2021 · 6 Aug · Shift 1 MCQ

Find the radius of Be^{3+} ions in its ground state assuming Bohr's model to be valid ($a_0 = 53\,pm$).

(A) 20 pm
(B) 18.2 pm
(C) 16.2 pm
(D) 13.2 pm

Answer: (D) 13.2 pm · The council's preliminary key

Q92 TS EAMCET 2021 · 6 Aug · Shift 2 MCQ

In hydrogen atom spectra, if the ratio of wavelengths corresponding to the first line of Balmer series and the first line of Lyman series is 9α, the value of α is

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(A) 0.5
(B) 0.8
(C) 0.6
(D) 0.4

Answer: (C) 0.6 · The council's preliminary key

Q93 TS EAMCET 2021 · 5 Aug · Shift 2 MCQ

A hydrogen atom emits a photon corresponding to an electron transition from n = 5 to n = 1. If R is the Rydberg constant, then the wavelength of emitted photon is

(A) $\frac{25}{24R}$
(B) $\frac{24R}{25}$
(C) $\frac{4}{5R}$
(D) $\frac{5R}{4}$

Answer: (A) $\frac{25}{24R}$ · The council's preliminary key

Q94 TS EAMCET 2021 · 4 Aug · Shift 1 MCQ

Hydrogen atom in the ground state absorbs ΔE amount of energy. If the orbital angular momentum of the electron is increased by $\frac{h}{2\pi}$ (h = Plank constant), then the magnitude of ΔE is

(A) 12.09 eV
(B) 12.75 eV
(C) 10.2 eV
(D) 13.6 eV

Answer: (C) 10.2 eV · The council's preliminary key

Q95 AP EAMCET 2020 · 7 Oct · Shift 1 MCQ

The wavelength of the first line of Balmer series of hydrogen atom is λ, what will be the wavelength of the same line in doubly ionized lithium?

(A) $\frac{\lambda}{2}$
(B) $\frac{\lambda}{9}$
(C) $\frac{\lambda}{8}$
(D) $\frac{\lambda}{27}$

Answer: (B) $\frac{\lambda}{9}$ · The council's preliminary key

Q96 AP EAMCET 2020 · 23 Sep · Shift 1 MCQ

Minimum excitation potential of Bohr's first orbit of Hydrogen atom is _____

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(A) $3.6\ \text{V}$
(B) $10.2\ \text{V}$
(C) $13.6\ \text{V}$
(D) $3.4\ \text{V}$

Answer: (B) $10.2\ \text{V}$ · The council's preliminary key

Q97 AP EAMCET 2020 · 22 Sep · Shift 1 MCQ

In Bohr's theory the potential of an electron at a position is $\frac{Kr^2}{2}$, where K is a constant. Then the quantized energy of the electron in n^{th} orbit is

(A) $\frac{nhK}{2\pi m}$
(B) $\frac{nh}{2\pi}\sqrt{\frac{K}{m}}$
(C) $\frac{nhm}{2\pi K}$
(D) $\frac{nh}{2\pi}\sqrt{\frac{m}{K}}$

Answer: (B) $\frac{nh}{2\pi}\sqrt{\frac{K}{m}}$ · The council's preliminary key

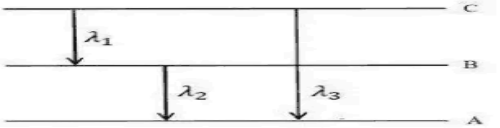
Q98 AP EAMCET 2020 · 22 Sep · Shift 2 MCQ

Energy levels A, B, C of a certain atom correspond to increasing values of energy that is, $E_A < E_B < E_C$. If $\lambda_1, \lambda_2, \lambda_3$ are the wavelengths of radiations corresponding to the transitions C to B, B to A and C to A respectively, as shown in figure. Which of the following statements is correct? *(see the figure above)*

Orientation : Vertical

Energy levels A, B, C of a certain atom correspond to increasing values of energy that is, $E_A < E_B < E_C$. If λ_1, λ_2, λ_3 are the wavelengths of radiations corresponding to the transitions C to B, B to A and C to A respectively, as shown in figure. Which of the following statements is correct?

నిర్దిష్ట పరమాణువుకు సంబంధించిన శక్తి స్థాయిలు A, B, C ల పరుగుతున్న విలువలు $E_A < E_B < E_C$. పటములో చూపినట్లు C నుండి B కి, B నుండి A కి, C నుండి A కి జరిగే బదిలీల వల్ల వెలువడిన వికిరణముల తరంగదైర్ఘ్యాలు వరుసగా λ_1, λ_2, λ_3 అయితే క్రింది వాటిలో సరి అయిన ప్రవచనము



Options :

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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(A) $\lambda_3 = \lambda_1 + \lambda_2$
(B) $\lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$
(C) $\lambda_1 + \lambda_2 + \lambda_3 = 0$
(D) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

Answer: (B) $\lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$ · The council's preliminary key

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Q99 AP EAMCET 2020 · 18 Sep · Shift 1 MCQ

A hydrogen like atom has one electron revolving round a stationary nucleus. If the energy required to excite the electron from the 2nd orbit to 3rd orbit is $47.2\,\text{eV}$, find the atomic number of the given atom.

(A) 3
(B) 4
(C) 5
(D) 6

Answer: (C) 5 · The council's preliminary key

Q100 AP EAMCET 2020 · 18 Sep · Shift 2 MCQ

The second line of Balmer series has wavelength 4861 Å. The wavelength of the first line of Balmer series is _____

(A) 1216 Å
(B) 6563 Å
(C) 4340 Å
(D) 4101 Å

Answer: (B) 6563 Å · The council's preliminary key

Q101 AP EAMCET 2020 · 17 Sep · Shift 1 MCQ

Frank and Hertz experiment proves that _____

(A) Light moves in the form of waves as well as particles
(B) The electron does not radiate energy while moving in an orbit
(C) The energy states of an atom are quantized
(D) The whole of the +ve charge of the atom is concentrated in the nucleus

Answer: (C) The energy states of an atom are quantized · The council's preliminary key

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Q102 TS EAMCET 2020 · 14 Sep · Shift 1 MCQ

The shortest wavelength in Lyman series is 912 Å. Then the longest wavelength in the series must be

(A) 9120 Å
(B) 1824 Å
(C) 1216 Å
(D) 2432 Å

Answer: (C) 1216 Å · Official TGCHE final key

Q103 TS EAMCET 2020 · 14 Sep · Shift 2 MCQ

If the first line in the Lyman series has wavelength λ, then the first line in Balmer series has the wavelength

(A) $\frac{27}{5}\lambda$
(B) $\frac{32}{27}\lambda$
(C) $\frac{28}{21}\lambda$
(D) $\frac{15}{4}\lambda$

Answer: (A) $\frac{27}{5}\lambda$ · Official TGCHE final key

Q104 TS EAMCET 2020 · 11 Sep · Shift 2 MCQ

A monochromatic light of wavelength λ ejects photoelectrons from a metal surface with work function (φ) 2.4 eV. These photoelectrons are made to collide with hydrogen atoms in ground state. The maximum value of λ for which hydrogen atom may be ionized is
[Take hc = 1240 eV-nm]

(A) 80 nm
(B) 77.5 nm
(C) 75.5 nm
(D) 85 nm

Answer: (B) 77.5 nm · Official TGCHE final key

Q105 TS EAMCET 2020 · 10 Sep · Shift 1 MCQ

The ratio of maximum to minimum wavelength in Balmer series of an hydrogenic atom is

(A) $\frac{9}{5}$
(B) $\frac{12}{7}$
(C) $\frac{9}{7}$
(D) $\frac{14}{9}$

Answer: (A) $\frac{9}{5}$ · Official TGCHE final key

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Q106 TS EAMCET 2020 · 10 Sep · Shift 2 MCQ

The wavelength of a spectral line emitted by hydrogen atom in the Balmer series is $\frac{16}{3R}$ (R is Rydberg constant). What is the value of the principal quantum number of the state from which the transition takes place?

(A) 2
(B) 3
(C) 4
(D) 5

Answer: (C) 4 · Official TGCHE final key

Q107 TS EAMCET 2020 · 9 Sep · Shift 1 MCQ

In the hydrogen atom spectrum, let E_1 and E_2 are energies for the transition $n = 2 \rightarrow n = 1$ and $n = 3 \rightarrow n = 2$ respectively. The ratio E_2/E_1 is

(A) $\frac{2}{3}$
(B) $\frac{3}{2}$
(C) $\frac{2}{9}$
(D) $\frac{5}{27}$

Answer: (D) $\frac{5}{27}$ · Official TGCHE final key

Q108 TS EAMCET 2020 · 9 Sep · Shift 2 MCQ

The de-Broglie wavelength of the electron in the first Bohr orbit of the hydrogen atom is

(A) equal to the diameter of the first orbit
(B) equal to the circumference of the first orbit
(C) equal to the half circumference of the first orbit
(D) independent of the size of the first orbit

Answer: (B) equal to the circumference of the first orbit · Official TGCHE final key

Q109 TS EAMCET 2020 · 9 Sep · Shift 2 MCQ

In hydrogen spectrum if the shortest wavelength in Balmer series is λ, the shortest wavelength in Bracket series is

(A) λ
(B) $\frac{\lambda}{2}$
(C) 4λ
(D) 9λ

Answer: (C) 4λ · Official TGCHE final key

Q110 TS EAMCET 2019 · 6 May · Shift 1 MCQ

Monochromatic radiation is incident on hydrogen sample which is in ground state. If the hydrogen atoms emit radiation of ten different wavelengths after absorbing incident radiation, then the wavelength of incident radiation is (Let $hc = 1242$ eV-nm)

(A) 84.4 nm
(B) 102.6 nm
(C) 72.5 nm
(D) 95.1 nm

Answer: (D) 95.1 nm · Official TGCHE final key

Q111 TS EAMCET 2019 · 4 May · Shift 1 MCQ

Let λ_P and λ_L be the longest wavelengths observed in the Paschen & Lyman series respectively. Choose the correct option:

(A) $4 < \frac{\lambda_P}{\lambda_L} < 6$
(B) $7 < \frac{\lambda_P}{\lambda_L} < 8$
(C) $15 < \frac{\lambda_P}{\lambda_L} < 16$
(D) $30 < \frac{\lambda_P}{\lambda_L} < 32$

Answer: (C) $15 < \frac{\lambda_P}{\lambda_L} < 16$ · Official TGCHE final key

Q112 TS EAMCET 2019 · 4 May · Shift 2 MCQ

A hydrogen sample is prepared in a particular excited state A of quantum number $n_A = 3$. The ground state energy of hydrogen atom is $-|E|$. The photons of energy $\frac{|E|}{12}$ are absorbed in the sample which results in excitation of some electrons to excited state B of quantum number n_B, whose value is

(A) 6
(B) 4
(C) 5
(D) 7

Answer: (A) 6 · Official TGCHE final key

Q113 TS EAMCET 2019 · 3 May · Shift 1 MCQ

The collision of an electron with kinetic energy 5.5 eV and a hydrogen atom in its ground state can be described as

(A) Completely inelastic
(B) May be completely inelastic
(C) May be partially elastic
(D) Elastic

Answer: (D) Elastic · Official TGCHE final key

Q114 TS EAMCET 2019 · 3 May · Shift 2 MCQ

To excite the spectral line of wavelength $4960\ \text{Å}$ of an atom, an excitation energy of $7.7\ \text{eV}$ is required. The ground state energy of the atom is $10.5\ \text{eV}$. The energies of two levels involved in the emission of $4960\ \text{Å}$ line are (Assume $hc = 1240\ \text{eV-nm}$, where h is Planck constant and c is speed of light)

(A) $14.2\ \text{eV},\ 16.1\ \text{eV}$
(B) $12.2\ \text{eV},\ 18.2\ \text{eV}$
(C) $15.7\ \text{eV},\ 20.5\ \text{eV}$
(D) $15.7\ \text{eV},\ 18.2\ \text{eV}$

Answer: (D) $15.7\ \text{eV},\ 18.2\ \text{eV}$ · Official TGCHE final key

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Q115 AP EAMCET 2019 · 23 Apr · Shift 1 MCQ

If the first excitation potential of a hypothetical hydrogen like atom is $15\ \text{V}$, then the third excitation potential of the atom is

(A) $13.6\ \text{V}$
(B) $\frac{4}{75}\ \text{V}$
(C) $\frac{15}{16}\ \text{V}$
(D) $\frac{75}{4}\ \text{V}$

Answer: (D) $\frac{75}{4}\ \text{V}$ · Official APSCHE final key

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Q116 AP EAMCET 2019 · 22 Apr · Shift 1 MCQ

Speed of electron in its 1st Bohr's orbit is given by $2.18 \times 10^6\ \text{ms}^{-1}$. If the time period of electron in n^{th} orbit is measured as 4.10 femto second, the value of n is

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

Answer: (C) 3 · Official APSCHE final key

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Q117 AP EAMCET 2019 · 22 Apr · Shift 2 MCQ

A hydrogen atom emits a photon of wavelength $\frac{36}{35R}$ when it is jumped from its nth excited state to ground state. Then the quantum number n is (R is Rydberg constant)

(A) 8
(B) 7
(C) 5
(D) 6

Options (3) or (4) were accepted. More than one answer was accepted. · Official APSCHE final key

Q118 AP EAMCET 2019 · 21 Apr · Shift 2 MCQ

In a hydrogen atom, an electron of mass $9.1 \times 10^{-31}\ \text{kg}$ revolves about a proton in circular orbit of radius 0.53 Å. The radial acceleration and angular velocity of electron are respectively

(A) $9 \times 10^{22}\ \text{ms}^{-2},\ 4.1 \times 10^{16}\ \text{s}^{-1}$
(B) $4.1 \times 10^{16}\ \text{ms}^{-2},\ 9 \times 10^{22}\ \text{s}^{-1}$
(C) $9 \times 10^{16}\ \text{ms}^{-2},\ 4.1 \times 10^{22}\ \text{s}^{-1}$
(D) $4.1 \times 10^{22}\ \text{ms}^{-2},\ 9 \times 10^{16}\ \text{s}^{-1}$

Answer: (A) $9 \times 10^{22}\ \text{ms}^{-2},\ 4.1 \times 10^{16}\ \text{s}^{-1}$ · Official APSCHE final key

Q119 AP EAMCET 2019 · 21 Apr · Shift 2 MCQ

When a hydrogen atom emits a photon during a transition from $n = 4$ to $n = 2$, its recoil speed is about

(A) $4.28\ \text{ms}^{-1}$
(B) $0.814\ \text{ms}^{-1}$
(C) $2.07\ \text{ms}^{-1}$
(D) $0.407\ \text{ms}^{-1}$

Answer: (B) $0.814\ \text{ms}^{-1}$ · Official APSCHE final key

Q120 AP EAMCET 2019 · 20 Apr · Shift 1 MCQ

In a system, a particle A of mass m and charge $-2q$ is moving in the nearest orbit around a very heavy particle B having charge $+q$. Assuming Bohr's model of the atom to be applicable to this system, the orbital angular velocity of the particle A is

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(A) $\frac{2\pi m^2 q^2}{\epsilon_0 h^4}$
(B) $\frac{3\pi m^3 q^2}{\epsilon_0^3 h^2}$
(C) $\frac{2\pi m q^4}{\epsilon_0^2 h^3}$
(D) $\frac{5\pi m^2 q^3}{\epsilon_0^3 h^2}$

Answer: (C) $\frac{2\pi m q^4}{\epsilon_0^2 h^3}$ · Official APSCHE final key

Q121 AP EAMCET 2019 · 20 Apr · Shift 2 MCQ

Match the following List-I with List-II in connection with Bohr's atomic model
List-I
A) Speed of revolution of electron
B) Kinetic energy
C) Total energy
D) Frequency
List-II
I) $\frac{1}{4\pi\epsilon_0}\frac{2\pi z e^2}{nh}$
II) $-\left(\frac{1}{4\pi\epsilon_0}\right)^2\frac{2\pi^2 m e^4 z^2}{n^2 h^2}$
III) $\left(\frac{1}{4\pi\epsilon_0}\right)^2\frac{2\pi^2 m e^4 z^2}{n^2 h^2}$
IV) $\left(\frac{1}{4\pi\epsilon_0}\right)^2\frac{4\pi^2 z^2 e^4 m}{n^3 h^3}$
The correct answer is

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

Answer: (A) A-I, B-III, C-II, D-IV · Official APSCHE final key

Q122 TS EAMCET 2018 · 7 May · Shift 1 MCQ

In a hydrogen sample, if the atoms are excited to states with principal quantum number 20, the number of different wavelengths which may be observed in the spectrum is

(A) 100
(B) 140
(C) 190
(D) 230

Answer: (C) 190 · The council's preliminary key

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Q123 TS EAMCET 2018 · 5 May · Shift 1 MCQ

Consider an electron revolving in a circular orbit of hydrogen atom whose quantum number $n = 2$. The velocity of the electron in that orbit is

(A) 1.1×10^6 m/s
(B) 2.2×10^7 m/s
(C) 4.4×10^6 m/s
(D) 2.2×10^5 m/s

Answer: (A) 1.1×10^6 **m/s** · The council's preliminary key

Q124 TS EAMCET 2018 · 4 May · Shift 2 MCQ

The frequency of light emitted when the electron makes transition from the level of principal quantum number $n = 2$ to the level with $n = 1$ is (Take the ionization energy of hydrogen to be 13.6 eV and $h \simeq 4 \times 10^{-15}$ eV-sec)

(A) 2.55×10^{15} Hz
(B) 1.7×10^{15} Hz
(C) 3.4×10^{15} Hz
(D) 5.1×10^{15} Hz

Answer: (A) 2.55×10^{15} **Hz** · The council's preliminary key

Q125 AP EAMCET 2018 · 24 Apr · Shift 1 MCQ

The approximate value of principal quantum number for a circular orbit of hydrogen atom of radius 530 nm is

(A) 26
(B) 100
(C) 200
(D) 21

Answer: (B) 100 · The council's preliminary key

Q126 AP EAMCET 2018 · 24 Apr · Shift 2 MCQ

A moving Hydrogen atom makes a head on collision with a stationary Hydrogen atom. Before collision both atoms are in ground state and after collision they move together. The minimum kinetic energy of the moving Hydrogen atom, such that one of the atoms reaches the excitation state is

_____

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(A) $13.6\ \text{eV}$
(B) $30.6\ \text{eV}$
(C) $20.4\ \text{eV}$
(D) $10.2\ \text{eV}$

Answer: (C) $20.4\ \text{eV}$ · The council's preliminary key

Q127 AP EAMCET 2018 · 23 Apr · Shift 1 MCQ

The difference between the radii of nth and $(n+1)^{\text{th}}$ orbits of hydrogen atom is equal to the radius of $(n-1)^{\text{th}}$ orbit of hydrogen. The angular momentum of the electron in the nth orbit is _____ (h is Plank's constant)

(A) $\frac{h}{\pi}$
(B) $\frac{2h}{\pi}$
(C) $\frac{3h}{\pi}$
(D) $\frac{4h}{\pi}$

Answer: (B) $\frac{2h}{\pi}$ · The council's preliminary key

Q128 AP EAMCET 2018 · 23 Apr · Shift 1 MCQ

The maximum potential energy due to electrostatic repulsion between two hydrogen nuclei is nearly (radius of the nucleus = 1.1 fermi) $\left[\frac{1}{4\pi\epsilon_0} = 9 \times 10^9\ \text{Nm}^2\text{C}^{-2}\right]$

(A) 0.65 MeV
(B) 2.09 MeV
(C) 3.31 MeV
(D) 0.92 MeV

Answer: (A) 0.65 MeV · The council's preliminary key

Q129 AP EAMCET 2018 · 23 Apr · Shift 2 MCQ

If λ_1 and λ_2 are the wavelengths of the photons emitted when electrons in the nth orbit of hydrogen atom fall to first excited state and ground state respectively, then the value of n is

(A) $\sqrt{\frac{2(\lambda_2-\lambda_1)}{2\lambda_2-\lambda_1}}$

(B) $\sqrt{\frac{2\lambda_2-\lambda_1}{2(\lambda_2-\lambda_1)}}$

(C) $\sqrt{\frac{4\lambda_2-\lambda_1}{4(\lambda_2-\lambda_1)}}$

(D) $\sqrt{\frac{4(\lambda_2-\lambda_1)}{(4\lambda_2-\lambda_1)}}$

Answer: (D) $\sqrt{\frac{4(\lambda_2-\lambda_1)}{(4\lambda_2-\lambda_1)}}$ · The council's preliminary key

Q130 AP EAMCET 2018 · 22 Apr · Shift 2 MCQ

A stationary hydrogen atom undergoes a transition from n = 5 to n = 4. Recoil speed of the atom is (R = Rydberg constant, h = Planck's constant, m = mass of the proton).

(A) $\frac{Rh}{m}$

(B) $\frac{9m}{400\,Rh}$

(C) $\frac{9Rh}{400\,m}$

(D) $\frac{7Rh}{400}$

Answer: (C) $\frac{9Rh}{400\,m}$ · The council's preliminary key

Q131 TS EAMCET 2017 · 12 May · Offline MCQ

An electron collides with a Hydrogen atom in its ground state and excites it to n = 3 state. The energy given to the Hydrogen atom in this inelastic collision (neglecting the recoil of Hydrogen atom) is

(A) 10.2 eV

(B) 12.1 eV

(C) 12.5 eV

(D) 13.6 eV

Answer: (B) 12.1 eV · The council's preliminary key

Q132 AP EAMCET 2017 · 26 Apr · Shift 1 MCQ

The radius of orbit of an electron and the speed of electron in the ground state of hydrogen atom are 5.5×10^{-11} m and 4×10^{6} ms^{-1} respectively. Then the orbital period of this electron in the first excited state will be _____

(A) 9.608×10^{-16} s
(B) 8.9068×10^{-16} s
(C) 7.806×10^{-16} s
(D) 6.908×10^{-16} s

Answer: (D) 6.908×10^{-16} s · The council's preliminary key

Q133 AP EAMCET 2017 · 26 Apr · Shift 2 MCQ

If $\Delta\lambda_L$ is the difference between shortest and longest wavelengths of Lymann series and $\Delta\lambda_B$ is the difference between shortest and longest wavelengths of Balmer series, then $\frac{\Delta\lambda_B}{\Delta\lambda_L} =$

(A) 2.4
(B) 4.8
(C) 7.2
(D) 9.6

Answer: (D) 9.6 · The council's preliminary key

Q134 AP EAMCET 2017 · 25 Apr · Shift 1 MCQ

In an atom the difference between two energy levels is 3.31 eV, then the wavelength of the radiation emitted when the transition takes place between these levels is nearly

(A) 3750 Å
(B) 5620 Å
(C) 7560 Å
(D) 5890 Å

Answer: (A) 3750 Å · The council's preliminary key

Q135 AP EAMCET 2017 · 25 Apr · Shift 2 MCQ

A stationary hydrogen atom emits a photon corresponding to first line of Lyman series. Recoil velocity of the atom is nearly

(A) $3.2\ \mathrm{ms}^{-1}$
(B) $0.63\ \mathrm{ms}^{-1}$
(C) $8.2\ \mathrm{ms}^{-1}$
(D) $0.1\ \mathrm{ms}^{-1}$

Answer: (A) $3.2\ \mathrm{ms}^{-1}$ · Checked by our team

Q136 AP EAMCET 2017 · 24 Apr · Shift 1 MCQ

The radius of the innermost electron orbit of hydrogen atom is 5.3×10^{-11} m. Then the ratio of radii of the orbits of $n = 2$ and $n = 3$ is

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(A) $9:4$
(B) $2:3$
(C) $4:9$
(D) $3:2$

Answer: (C) $4:9$ · The council's preliminary key

Q137 AP EAMCET 2017 · 24 Apr · Shift 2 MCQ

The ratio of acceleration of the electron in singly ionized Helium atom to that of Hydrogen atom (both in ground state) is

(A) 2
(B) 4
(C) 16
(D) 8

Answer: (D) 8 · The council's preliminary key

Q138 TS EAMCET 2016 · 15 May · Offline MCQ

If the first line of Lymann series has a wavelength 1215.4 Å, the first line of Balmer series is approximately

(A) 4864 Å
(B) 1025.5 Å
(C) 6563 Å
(D) 6400 Å

Answer: (C) 6563 Å · Official TGCHE final key

Q139 AP EAMCET 2016 · 29 Apr · Offline MCQ

An electron in a hydrogen atom undergoes a transition from a higher energy level to a lower energy level. The incorrect statement of the following is

(A) Kinetic energy of the electron increases
(B) Velocity of the electron increases
(C) Angular momentum of the electron remains constant
(D) Wavelength of de-Broglie wave associated with the motion of electron decreases

Answer: (C) Angular momentum of the electron remains constant · The council's preliminary key

Q140 AP EAMCET 2014 · 22 May · Offline MCQ

The radius of the first orbit of hydrogen is r_H, and the energy in the ground state is -13.6 eV. Considering a μ^--particle with a mass $207\,m_e$ revolving round a proton as in Hydrogen atom, the

energy and radius of proton and μ^- combination respectively in the first orbit are (assume nucleus to be stationary)

(A) -13.6×207 eV, $\frac{r_H}{207}$

(B) -207×13.6 eV, $207\, r_H$

(C) $\frac{-13.6}{207}$ eV, $\frac{r_H}{207}$

(D) $\frac{-13.6}{207}$ eV, $207\, r_H$

Answer: (A) -13.6×207 eV, $\frac{r_H}{207}$ · The council's preliminary key

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Q141 AP EAMCET 2011 · 8 May · Offline MCQ

Calculate the wavelength of the k_α line for $z = 31$ when $a = 5 \times 10^7\ \mathrm{Hz}^{1/2}$ for a characteristic X-ray spectrum.

(A) $1.33\ \text{Å}$

(B) $1.33\ \mathrm{nm}$

(C) $133 \times 10^{-10}\ \mathrm{m}$

(D) $133\ \mathrm{nm}$

Answer: (A) $1.33\ \text{Å}$ · The council's preliminary key

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