EdLoop JEE

CHEMISTRY · JEE MAIN

# Atomic Structure

## Previous Year Questions with answers

**242** questions · **193** papers · **2002–2026** · newest paper first

**Step-by-step solutions for every question: free in the EdLoop JEE app (Google Play) · pyq.edloop.in**

**What is in this PDF:** every Atomic Structure question we hold from past JEE Main and AIEEE 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.

**Step-by-step solutions** for every question are free in the EdLoop JEE app (Google Play) and on app.edloop.in. More chapters: pyq.edloop.in/free-pdfs/

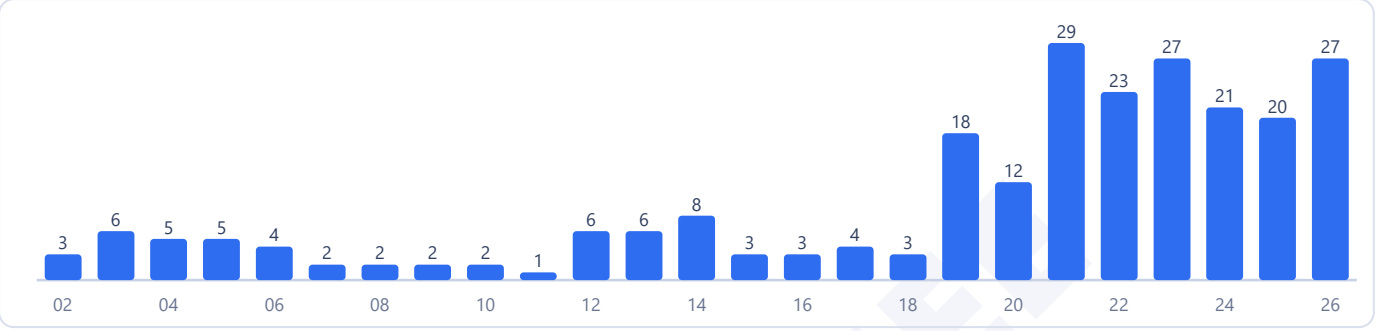
EdLoop

# Chapter at a glance

| 3.9% | 242 | 156 of 162 | 180 / 62 |
|---|---|---|---|
| of Chemistry questions, 2019–2026 | questions, 2002–2026 | papers asked it, 2019–2026 | MCQ / numerical, 2002–2026 |

**Trend.** Steady: 1.2 questions per paper in 2024–2026 against 1 in 2019–2023.

### Questions per year




Counts are the questions we hold: 242 in 193 papers. 2 questions in this chapter came back in more than one paper.

### Most-asked topics in this chapter (2002–2026)




## How often it comes up

Atomic structure examines quantum mechanical models of atoms and electron address rules under Unit 2: Atomic Structure in the Class 11 curriculum, holding rank 11 among the 31 chemistry chapters with a 3.9 percent share of total chemistry questions. In the computer-based testing era from 2019 to 2026, candidates answered 177 questions across 162 papers, delivering an average frequency of 1.1 questions per shift. The chapter appeared in 156 of those 162 papers, and questions were featured every single year without interruption. During the recent 2024 to 2026 cycle, testing registered 68 questions across 58 papers, raising the average to 1.2 questions per shift and lifting its subject share to 4.4 percent. This marks a trend that is up compared to the 3.9 percent share across the entire 2019 to 2026 window. When measured against the 2002 to 2018 era, which recorded 65 questions across 38 papers for a 4.8 percent share, the recent share has stayed about the same. In 2026 alone, examiners included 27 questions across 19 papers, showing up in 19 separate test shifts. A total of 62 questions from 2019 to 2026 required numerical answers, with candidates evaluating radial nodes, transition energies, and quantum number counts.

## Most-asked topics

Questions in this chapter divide across five distinct areas:

- **Quantum Mechanical Model**: 86 questions historically, with 68 between 2019 and 2026, tested up to 2026. This dominant topic assesses de Broglie matter waves, Heisenberg uncertainty principle, Schrodinger wave equations, radial and angular wave functions, radial probability distribution curves, and total node counting using n and l.
- **Bohr Model & Hydrogen Spectrum**: 68 total problems, including 51 from 2019 to 2026, continuing in 2026. Core concepts evaluate orbital radii, electron velocities, ionization energies of hydrogen-like species such as

helium and lithium ions, Rydberg transitions, and line energy comparisons across spectral series.

- **Electronic Configuration**: 41 lifetime questions, with 27 asked between 2019 and 2026, tested through 2026. Problems assess the Aufbau principle, Hund's rule of maximum multiplicity, Pauli exclusion principle, orbital energy ordering by n plus l rules, and exceptional half-filled or fully-filled d-subshell configurations.
- **Electromagnetic Radiation & Quantum Theory**: 35 questions overall, including 28 between 2019 and 2026, tested in 2026. Questions explore photoelectric effect parameters, threshold work functions, Planck's quantum theory, photon energy calculations, and radiation intensity.
- **Early Models & Subatomic Particles**: 12 questions since 2002, with 3 asked between 2019 and 2026, tested in 2026. Themes evaluate Thomson and Rutherford atomic models, subatomic particle properties, neutron-to-electron ratios, and isotope or isobar classifications.

## What the questions look like

JEE Main tests atomic structure through quantum number constraints and spectral line energy ratios:

- **Maximum electron counts from quantum numbers**: Identifying how many electrons in an atom can simultaneously share specified sets of quantum numbers, such as a fixed principal quantum number and magnetic quantum number.
- **Spectral transition energy ordering**: Arranging emission lines from different hydrogen series, such as the first and third Paschen lines alongside Balmer lines, in order of increasing photon energy.
- **Orbital energy comparison by Aufbau rules**: Ranking a given collection of atomic subshells in order of increasing energy using the n plus l rule, resolving ties with principal quantum numbers.
- **Subatomic particle bookkeeping in ions**: Deducing the mass number, periodic group, and chemical identity of a negative mono-anion from its stated neutron and electron counts.

## How to practise it

Master the four quantum numbers and their allowed ranges. Principal quantum number n determines shell energy, azimuthal quantum number l runs from zero to n minus one, magnetic quantum number m runs from minus l to plus l, and spin quantum number s is either plus or minus one-half. Remember that each individual orbital holds a maximum of two electrons with opposite spins.

Learn the node counting formulas thoroughly. Spherical or radial nodes equal n minus l minus one, angular or planar nodes equal l, and total nodes equal n minus one. Practice sketching radial probability density plots psi squared against distance r, identifying where the function touches the axis.

For hydrogen spectral series, use Rydberg wavenumber formulas. The transition from n two to n one has energy proportional to Z squared multiplied by the difference of inverse squares of the quantum levels.

EdLoop JEE

**Q1** JEE Main 2026 · 8 Apr · Shift 2 · Numerical

Consider two radiations of wavelengths

1. $\lambda_1 = 2000$ Å

1. $\lambda_2 = 6000$ Å

The ratio of the energies of these two radiations $\left(\frac{E_1}{E_2}\right)$ is _____ (Nearest integer).

Numerical value type: the answer is a number.

**Answer: 3.** · Official NTA final key

**Q2** JEE Main 2026 · 6 Apr · Shift 1 · MCQ

If shortest wavelength of hydrogen atom in Lyman series is $x$, then longest wavelength in Balmer series of $He^+$ is:

(A) $\frac{9x}{5}$

(B) $\frac{36x}{5}$

(C) $\frac{x}{4}$

(D) $\frac{5x}{9}$

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

**Q3** JEE Main 2026 · 6 Apr · Shift 1 · MCQ

Match the **LIST-I** with **LIST-II**

| **List-I Orbital** | **List-II Radial nodes and nodal plane** |
|---|---|
| A. 2s | I. 1 Radial node + two nodal planes |
| B. 3s | II. 1 Radial node + one nodal plane |
| C. 3p | III. 2 Radial nodes + No nodal plane |
| D. 4d | IV. 1 Radial node + No nodal plane |

Choose the *__correct__* answer from the options given below:

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

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

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

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

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

EdLoop JEE

**Q4** JEE Main 2026 · 6 Apr · Shift 2 MCQ

The Bohr radius of a hydrogen like species is 70.53 pm. The species and the stationary state (n) are respectively
(Given : Hydrogen atom Bohr radius is 52.9 pm)

(A) $Li^{2+}$, 3
(B) $He^{+}$, 3
(C) $He^{+}$, 2
(D) $Li^{2+}$, 2

**Answer: (D)** $Li^{2+}$, 2 · Official NTA final key

**Q5** JEE Main 2026 · 5 Apr · Shift 1 MCQ

Arrange the following atomic orbitals of multi electron atoms in order of increasing energy.

A. $n = 3,\ l = 2,\ m = +1$

B. $n = 4,\ l = 0,\ m = 0$

C. $n = 6,\ l = 1,\ m = 0$

D. $n = 5,\ l = 1,\ m = +1$

E. $n = 2,\ l = 1,\ m = +1$

Choose the correct answer from the options given below:

(A) C < D < B < A < E
(B) B < A < E < C < D
(C) E < C < D < B < A
(D) E < B < A < D < C

**Answer: (D)** E < B < A < D < C · Official NTA final key

**Q6** JEE Main 2026 · 5 Apr · Shift 1 MCQ

Identify the **correct** statements from the following :

A. Heisenberg uncertainty principle is applicable to electrons.

B. The size of $2p_x$ orbital is less than the size of $3p_x$ orbital.

C. The energy of 2s orbital of H atom is equal to the energy of 2s orbital of Li.

D. The electronic configuration of Cr is $[Ar]\ 3d^5\ 4s^1$

Choose the correct answer from the options given below:

(A) A, B and C Only
(B) A, B and D Only
(C) B, C and D Only
(D) A, C and D Only

**Answer: (B) A, B and D Only** · Official NTA final key

**Q7** JEE Main 2026 · 5 Apr · Shift 2 MCQ

Which of the following statement(s) is/are **true** ?

A. If two orbitals have the same value of $(n + l)$, the orbital with lower value of n will have lower energy.

B. Energies of the orbitals in the same subshell increase with increase in atomic number.

C. The size of $2p_x$ orbital is less than the size of $3p_x$ orbital.

D. Among 5f, 6s, 4d, 5p and 5d orbitals, none of the orbitals have 2 radial nodes.

Choose the **correct** answer from the options given below :

(A) A, B and C only
(B) A and C only
(C) C and D only
(D) A only

**Answer: (B) A and C only** · Official NTA final key

**Q8** JEE Main 2026 · 4 Apr · Shift 1 MCQ

What is the ratio of wave number of first line (lowest energy line) of Balmer series of H atomic spectrum to first line of its Brackett series?

(A) 5:1
(B) 5:0.81
(C) 5:1.75
(D) 5:27

**Answer: (B) 5:0.81** · Official NTA final key

**Q9** JEE Main 2026 · 4 Apr · Shift 1 MCQ

Which of the following is correct set of 4 quantum numbers of $19^{\text{th}}$ electron in Chromium (Atomic number = 24) in accordance with Aufbau principle?

(A) $n = 3,\ l = 2,\ m = +2,\ s = +\frac{1}{2}$
(B) $n = 3,\ l = 2,\ m = -2,\ s = +\frac{1}{2}$
(C) $n = 4,\ l = 1,\ m = 0,\ s = +\frac{1}{2}$
(D) $n = 4,\ l = 0,\ m = 0,\ s = +\frac{1}{2}$

**Answer: (D)** $n = 4,\ l = 0,\ m = 0,\ s = +\frac{1}{2}$ · Official NTA final key

## Q10 JEE Main 2026 · 4 Apr · Shift 1 MCQ

A monoatomic anion ($A^-$) has 45 neutrons and 36 electrons. Atomic mass, group in the periodic table and physical state at room temperature of the element (A) respectively are

(A) 80, 17, liquid
(B) 81, 16, solid
(C) 80, 16, gas
(D) 81, 15, gas

**Answer: (A) 80, 17, liquid** · Official NTA final key

## Q11 JEE Main 2026 · 4 Apr · Shift 2 MCQ

The species having identical radii according to the Bohr's theory are:

A. H (first orbit)

B. $He^+$ (first orbit)

C. $He^+$ (Second orbit)

D. $Li^{2+}$ (first orbit)

E. $Be^{3+}$ (Second orbit)

Choose the correct answer from the options given below:

(A) A and C Only
(B) A and E Only
(C) B and E Only
(D) C and D Only

**Answer: (B) A and E Only** · Official NTA final key

## Q12 JEE Main 2026 · 2 Apr · Shift 1 MCQ

What is the energy (in J atom$^{-1}$) required for the following process ?

$Li^{2+}(g) \rightarrow Li^{3+}(g) + e^-$

(Take the ionization energy for the H atom in the ground state as $2.18 \times 10^{-18}$ J atom$^{-1}$)

EdLoop JEE

(A) $8.72 \times 10^{-18}$

(B) $1.962 \times 10^{-18}$

(C) $1.962 \times 10^{-17}$

(D) $6.54 \times 10^{-17}$

**Answer: (C)** $1.962 \times 10^{-17}$ · Official NTA final key

**Q13** JEE Main 2026 · 2 Apr · Shift 2 Numerical

The surface of sodium metal is irradiated with radiation of wavelength $x$ nm. The kinetic energy of ejected electrons is $2.8 \times 10^{-20}$ J. The work function of sodium is 2.3 eV. The value of $x$ is _____ $\times 10^2$ nm. (Nearest integer)

(Given : $h = 6.6 \times 10^{-34}$ J s ; 1 eV $= 1.6 \times 10^{-19}$ J; c $= 3.0 \times 10^{8}$ m s$^{-1}$)

Numerical value type: the answer is a number.

**Answer: 5.** · Official NTA final key

**Q14** JEE Main 2026 · 28 Jan · Shift 1 MCQ

The wave numbers of three spectral lines of H atom are considered. Identify the set of spectral lines belonging to Balmer series.

(R = Rydberg constant)

(A) $\frac{5R}{36}, \frac{8R}{9}, \frac{15R}{16}$

(B) $\frac{7R}{144}, \frac{3R}{16}, \frac{16R}{255}$

(C) $\frac{3R}{4}, \frac{3R}{16}, \frac{7R}{144}$

(D) $\frac{5R}{36}, \frac{3R}{16}, \frac{21R}{100}$

**Answer: (D)** $\frac{5R}{36}, \frac{3R}{16}, \frac{21R}{100}$ · Official NTA final key

**Q15** JEE Main 2026 · 28 Jan · Shift 1 MCQ

*see figure*

Q.67

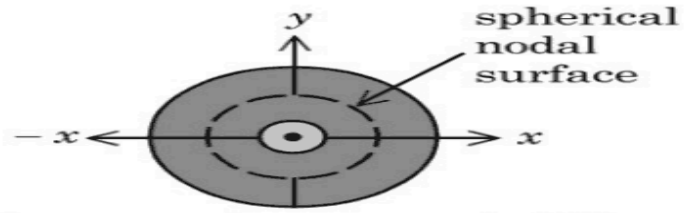



Figure 1. electron probability density for 2s orbital

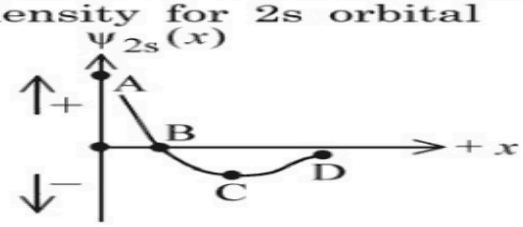



Figure 2. wave function for 2s orbital

Which of the following point in Figure 2 most accurately represents the nodal surface as shown in Figure 1?

Options 1. C
2. D
3. B
4. A

(A) C
(B) D
(C) B
(D) A

**Answer: (C) B** · Official NTA final key

## Q16 JEE Main 2026 · 28 Jan · Shift 2 MCQ

The wavelength of photon 'A' is 400 nm. The frequency of photon 'B' is $10^{16}$ $s^{-1}$. The wave number of photon 'C' is $10^4$ $cm^{-1}$. The correct order of energy of these photons is :

(A) C > B > A
(B) B > A > C
(C) A > C > B
(D) A > B > C

**Answer: (B) B > A > C** · Official NTA final key

## Q17 JEE Main 2026 · 28 Jan · Shift 2 Numerical

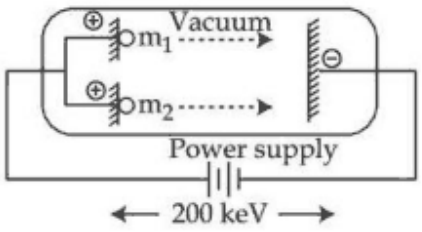
Two positively charged particles $m_1$ and $m_2$ have been accelerated across the same potential difference of 200 keV as shown below.

*(see the figure above)*

[Given mass of $m_1$ = 1 amu and $m_2$ = 4 amu]

The deBroglie wavelength of $m_1$ will be $x$ times of $m_2$. The value of $x$ is _____ (nearest integer)

**Q.75** Two positively charged particles $m_1$ and $m_2$ have been accelerated across the same potential difference of 200 keV as shown below.




[Given mass of $m_1 = 1$ amu and $m_2 = 4$ amu]
The deBroglie wavelength of $m_1$ will be $x$ times of $m_2$. The value of $x$ is _____ (nearest integer)

Numerical value type: the answer is a number.

**Answer: 2.** · Official NTA final key

---

**Q18** JEE Main 2026 · 24 Jan · Shift 1 · Numerical

The hydrogen spectrum consists of several spectral lines in Lyman series ($L_1$, $L_2$, $L_3$...; $L_1$ has lowest energy among Lyman series). Similarly it consists of several spectral lines in Balmer series ($B_1$, $B_2$, $B_3$ ... ; $B_1$ has lowest energy among Balmer lines). The energy of $L_1$ is $x$ times the energy of $B_1$. The value of $x$ is _____ $\times 10^{-1}$. (Nearest integer)

Numerical value type: the answer is a number.

**Answer: 54.** · Official NTA final key

---

**Q19** JEE Main 2026 · 24 Jan · Shift 2 · MCQ

The wavelength of spectral line obtained in the spectrum of $Li^{2+}$ ion, when the transition takes place between two levels whose sum is 4 and difference is 2, is

(A) $1.14 \times 10^{-7}$ cm
(B) $2.28 \times 10^{-7}$ cm
(C) $2.28 \times 10^{-6}$ cm
(D) $1.14 \times 10^{-6}$ cm

**Answer: (D)** $1.14 \times 10^{-6}$ **cm** · Official NTA final key

---

**Q20** JEE Main 2026 · 23 Jan · Shift 1 · MCQ

Given,

(A) n= 5, $m_l = -1$

(B) n= 3, l= 2, $m_l = -1$, $m_s = +\frac{1}{2}$

The maximum number of electron(s) in an atom that can have the quantum numbers as given in (A) and (B) respectively are :

(A) 8 and 1
(B) 26 and 1
(C) 2 and 4
(D) 4 and 1

**Answer: (A) 8 and 1** · Official NTA final key

---

**Q21** JEE Main 2026 · 23 Jan · Shift 1 MCQ

Which of the following statements regarding the energy of the stationary state is **true** in the following one - electron systems ?

(A) $+8.72 \times 10^{-18}$ J for first orbit of $He^{+}$ ion
(B) $+2.18 \times 10^{-18}$ J for second orbit of $He^{+}$ ion
(C) $-2.18 \times 10^{-18}$ J for third orbit of $Li^{2+}$ ion
(D) $-1.09 \times 10^{-18}$ J for second orbit of H atom.

**Answer: (C) $-2.18 \times 10^{-18}$ J for third orbit of $Li^{2+}$ ion** · Official NTA final key

---

**Q22** JEE Main 2026 · 23 Jan · Shift 2 MCQ

The work functions of two metals ($M_A$ and $M_B$) are in the 1 : 2 ratio. When these metals are exposed to photons of energy 6 eV, the kinetic energy of liberated electrons of $M_A$ : $M_B$ is in the ratio of 2.642 : 1. The work functions (in eV) of $M_A$ and $M_B$ are respectively.

(A) 2.3, 4.6
(B) 3.1, 6.2
(C) 1.4, 2.8
(D) 1.5, 3.0

**Answer: (A) 2.3, 4.6** · Official NTA final key

---

**Q23** JEE Main 2026 · 23 Jan · Shift 2 MCQ

Identify the INCORRECT statements from the following:

A. Notation $^{24}_{12}Mg$ represents 24 protons and 12 neutrons.

B. Wavelength of a radiation of frequency $4.5 \times 10^{15}$ $s^{-1}$ is $6.7 \times 10^{-8}$ m.

C. One radiation has wavelength = $\lambda_1$ (900 nm) and energy = $E_1$. Other radiation has wavelength = $\lambda_2$ (300 nm) and energy = $E_2$. $E_1 : E_2 = 3 : 1$.

D. Number of photons of light of wavelength 2000 pm that provides 1 J of energy is $1.006 \times 10^{16}$.

Choose the **correct** answer from the options given below:

(A) A and D Only
(B) A and C Only
(C) A and B Only
(D) B and C Only

**Answer: (B) A and C Only** · Official NTA final key

---

**Q24** JEE Main 2026 · 22 Jan · Shift 1 MCQ

The energy required by electrons, present in the first Bohr orbit of hydrogen atom to be excited to second Bohr orbit is _____ J $mol^{-1}$.

Given: $R_H = 2.18 \times 10^{-11}$ ergs.

(A) $9.835 \times 10^{12}$
(B) $9.835 \times 10^{5}$
(C) $1.635 \times 10^{-11}$
(D) $1.635 \times 10^{-18}$

**Answer: (B)** $9.835 \times 10^{5}$ · Official NTA final key

---

**Q25** JEE Main 2026 · 22 Jan · Shift 2 MCQ

The energy of first (lowest) Balmer line of H atom is $x$ J. The energy (in J) of second Balmer line of H atom is :

(A) $\frac{x}{1.35}$
(B) $x^2$
(C) $1.35x$
(D) $2x$

**Answer: (C)** $1.35x$ · Official NTA final key

---

**Q26** JEE Main 2026 · 21 Jan · Shift 1 MCQ

Given below are two statements :

**Statement I :** When an electric discharge is passed through gaseous hydrogen, the hydrogen molecules dissociate and the energetically excited hydrogen atoms produce electromagnetic radiation of discrete frequencies.

**Statement II :** The frequency of second line of Balmer series obtained from $He^+$ is equal to that of first line of Lyman series obtained from hydrogen atom.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) **Statement I** is true but **Statement II** is false
(B) Both **Statement I** and **Statement II** are true
(C) **Statement I** is false but **Statement II** is true
(D) Both **Statement I** and **Statement II** are false

**Answer: (B)** Both **Statement I** and **Statement II** are true · Official NTA final key

## Q27 JEE Main 2026 · 21 Jan · Shift 2 MCQ

Consider the following spectral lines for atomic hydrogen :

A. First line of Paschen series

B. Second line of Balmer series

C. Third line of Paschen series

D. Fourth line of Bracket series

The correct arrangement of the above lines in ascending order of energy is :

(A) C < D < B < A
(B) A < B < C < D
(C) D < C < A < B
(D) D < A < C < B

**Answer: (D)** D < A < C < B · Official NTA final key

## Q28 JEE Main 2025 · 8 Apr · Shift 2 MCQ

Correct statements for an element with atomic number 9 are

A. There can be 5 electrons for which $m_s = +\frac{1}{2}$ and 4 electrons for which $m_s = -\frac{1}{2}$

B. There is only one electron in $p_z$ orbital.

C. The last electron goes to orbital with $n = 2$ and $l = 1$.

D. The sum of angular nodes of all the atomic orbitals is 1 .

Choose the correct answer from the options given below:

(A) A, C and D Only
(B) C and D Only
(C) A and B Only
(D) A and C Only

**Answer: (D)** A and C Only · Key from source paper

## Q29 JEE Main 2025 · 8 Apr · Shift 2 Numerical

The energy of an electron in first Bohr orbit of H -atom is -13.6 eV. The magnitude of energy value of electron in the first excited state of $Be^{3+}$ is _____ eV (nearest integer value)

Numerical value type: the answer is a number.

**Answer: 54.** · Key from source paper

## Q30 JEE Main 2025 · 7 Apr · Shift 1 MCQ

Which of the following statements are correct, if the threshold frequency of caesium is $5.16 \times 10^{14}$ Hz ?

*(see the figure above)*

A. When Cs is placed inside a vacuum chamber with an ammeter connected to it and yellow light is focused on Cs, the ammeter shows the presence of current.

B. When the brightness of the yellow light is dimmed, the value of the current in the ammeter is reduced.

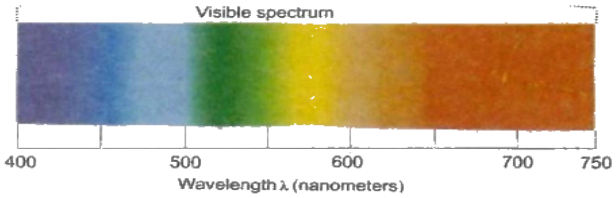
C. When a red light is used instead of the yellow light, the current produced is higher with respect to the yellow light.

D. When a blue light is used, the ammeter shows the formation of current.

E. When a white light is used. the ammeter shows formation of current.

Choose the correct answer from the options given below:

**8.** Which of the following statements are correct, if the threshold frequency of caesium is $5.16 \times 10^{14}$ Hz ?




A. When Cs is placed inside a vacuum chamber with an ammeter connected to it and yellow light is focused on Cs, the ammeter shows the presence of current.
B. When the brightness of the yellow light is dimmed, the value of the current in the ammeter is reduced.
C. When a red light is used instead of the yellow light, the current produced is higher with respect to the yellow light.
D. When a blue light is used, the ammeter shows the formation of current.
E. When a white light is used. the ammeter shows formation of current.

Choose the correct answer from the options given below:

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

(A) A, B, D and E Only
(B) A, C, D and E Only
(C) A, D and E Only
(D) B, C and D Only

**Answer: (A) A, B, D and E Only** · Key from source paper

**Q31** JEE Main 2025 · 7 Apr · Shift 2 MCQ

The extra stability of half-filled subshell is due to :

(A) Symmetrical distribution of electrons

(B) Smaller coulombic repulsion energy

(C) The presence of electrons with the same spin in non-degenerate orbitals

(D) Larger exchange energy

(E) Relatively smaller shielding of electrons by one another

Identify the correct statements :

(A) (B), (D) and (E) only
(B) (A), (B), (D) and (E) only
(C) (B), (C) and (D) only
(D) (A), (B) and (D) only

**Answer: (B)** (A), (B), (D) and (E) only · Key from source paper

**Q32** JEE Main 2025 · 4 Apr · Shift 1 MCQ

Which one of the following about an electron occupying the 1 s orbital in a hydrogen atom is incorrect? (Bohr's radius is represented by $a_0$ )

(A) The electron can be found at a distance $2a_0$ from the nucleus
(B) The probability density of finding the electron is maximum at the nucleus
(C) The 1s orbital is spherically symmetrical
(D) The total energy of the electron is maximum when it is at a distance $a_0$ from the nucleus

**Answer: (D)** The total energy of the electron is maximum when it is at a distance $a_0$ from the nucleus · Key from source paper

**Q33** JEE Main 2025 · 4 Apr · Shift 2 MCQ

Consider the ground state of chromium atom $(Z = 24)$. How many electrons are with Azimuthal quantum number $l = 1$ and $l = 2$ respectively ?

(A) 16 and 4
(B) 16 and 5
(C) 12 and 4
(D) 12 and 5

**Answer: (D)** 12 and 5 · Key from source paper

**Q34** JEE Main 2025 · 3 Apr · Shift 1 MCQ

Which of the following postulate of Bohr's model of hydrogen atom is not in agreement with quantum mechanical model of an atom?

(A) An atom can take only certain distinct energies $E_1, E_2, E_3$, etc. These allowed states of constant energy are called the stationary states of atom.

(B) The electron in a H atom's stationary state moves in a circle around the nucleus.

(C) An atom in a stationary state does not emit electromagnetic radiation as long as it stays in the same state.

(D) When an electron makes a transition from a higher energy stationary state to a lower energy stationary state, then it emits a photon of light.

**Answer: (B) The electron in a H atom's stationary state moves in a circle around the nucleus.** · Key from source paper

---

## Q35 JEE Main 2025 · 3 Apr · Shift 2 MCQ

For electrons in '2s' and '2p' orbitals, the orbital angular momentum values, respectively are :

(A) $\frac{h}{2\pi}$ and $\sqrt{2}\frac{h}{2\pi}$

(B) $\sqrt{2}\frac{h}{2\pi}$ and 0

(C) 0 and $\sqrt{2}\frac{h}{2\pi}$

(D) 0 and $\sqrt{6}\frac{h}{2\pi}$

**Answer: (C) 0 and $\sqrt{2}\frac{h}{2\pi}$** · Key from source paper

---

## Q36 JEE Main 2025 · 2 Apr · Shift 1 MCQ

According to Bohr's model of hydrogen atom, which of the following statement is incorrect?

(A) Radius of $6^{th}$ orbit is three times larger than that of $4^{th}$ orbit

(B) Radius of $3^{rd}$ orbit is nine times larger than that of $1^{st}$ orbit

(C) Radius of $4^{th}$ orbit is four times larger than that of $2^{nd}$ orbit

(D) Radius of $8^{th}$ orbit is four times larger than that of $4^{th}$ orbit

**Answer: (A) Radius of $6^{th}$ orbit is three times larger than that of $4^{th}$ orbit** · Key from source paper

---

## Q37 JEE Main 2025 · 2 Apr · Shift 2 MCQ

Which of the following statements are true?

(A) The subsidiary quantum number $l$ describes the shape of the orbital occupied by the electron.

(B) *(see the figure above)* is the boundary surface diagram of the $2p_x$ orbital.

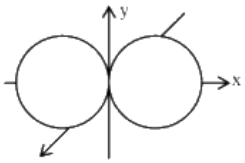
(C) The + and - signs in the wave function of the $2p_x$ orbital refer to charge.

(D) The wave function of $2p_x$ orbital is zero everywhere in the xy plane.

Choose the correct answer from the options given below :

**17.** Which of the following statements are true?

(A) The subsidiary quantum number $l$ describes the shape of the orbital occupied by the electron.

(B) 

is the boundary surface diagram of the $2p_x$ orbital.

(C) The + and - signs in the wave function of the $2p_x$ orbital refer to charge.

(D) The wave function of $2p_x$ orbital is zero everywhere in the xy plane.

Choose the correct answer from the options given below :

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

A (A), (B) and (C) only

B (A) and (B) only

C (B) and (D) only

D (C) and (D) only

**Answer: (B)** (A) and (B) only · Key from source paper

## Q38 JEE Main 2025 · 29 Jan · Shift 1 MCQ

If $a_0$ is denoted as the Bohr radius of hydrogen atom, then what is the de-Broglie wavelength ($\lambda$) of the electron present in the second orbit of hydrogen atom? [n : any integer]

A $\frac{8\pi a_0}{n}$

B $\frac{2a_0}{n\pi}$

C $\frac{4n}{\pi a_0}$

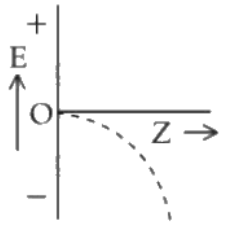
D $\frac{4\pi a_0}{n}$

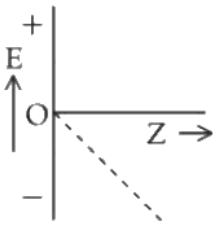
**Answer: (A)** $\frac{8\pi a_0}{n}$ · Key from source paper

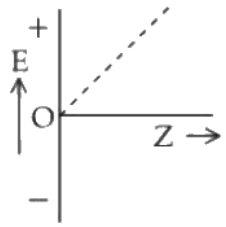
## Q39 JEE Main 2025 · 29 Jan · Shift 2 MCQ

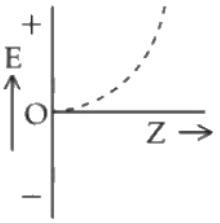
For hydrogen like species, which of the following graphs provides the most appropriate representation of E vs Z plot for a constant n ? [E: Energy of the stationary state, Z : atomic number, n = principal quantum number]

**Q58.** For hydrogen like species, which of the following graphs provides the most appropriate representation of E vs Z plot for a constant n ? [E: Energy of the stationary state, Z : atomic number, n = principal quantum number]

(1)



(2)



(3)



(4)



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

**Answer: (A)** · Key from source paper

## Q40 JEE Main 2025 · 29 Jan · Shift 2 MCQ

Given below are two statements : Statement (I) : It is impossible to specify simultaneously with arbitrary precision, both the linear momentum and the position of a particle. Statement (II) : If the uncertainty in the measurement of position and uncertainty in measurement of momentum are equal for an electron, then the uncertainty in the measurement of velocity is $\geq \sqrt{\frac{h}{\pi}} \times \frac{1}{2m}$. In the light of the above statements, choose the correct answer from the options given below :

(A) Statement I is false but Statement II is true
(B) Both Statement I and Statement II are false
(C) Both Statement I and Statement II are true
(D) Statement I is true but Statement II is false

**Answer: (C) Both Statement I and Statement II are true** · Key from source paper

## Q41 JEE Main 2025 · 28 Jan · Shift 1 MCQ

In a multielectron atom, which of the following orbitals described by three quantum numbers will have same energy in absence of electric and magnetic fields? A. n = 1,l = 0, $m_l$ = 0 B. n = 2,l = 0, $m_l$ = 0 C. n = 2,l = 1, $m_l$ = 1 D. n = 3,l = 2, $m_l$ = 1 E. n = 3,l = 2, $m_l$ = 0 Choose the correct answer from the options given below:

(A) B and C Only
(B) A and B Only
(C) C and D Only
(D) D and E Only

**Answer: (D) D and E Only** · Key from source paper

---

**Q42** JEE Main 2025 · 28 Jan · Shift 2 MCQ

Which of the following is/are not correct with respect to energy of atomic orbitals of hydrogen atom? (A) 1 s < 2p < 3 d < 4 s (B) 1 s < 2 s = 2p < 3 s = 3p (C) 1 s < 2 s < 2p < 3 s < 3p (D) 1 s < 2 s < 4 s < 3 d Choose the correct answer from the options given below :

(A) (A) and (C) only
(B) (B) and (D) only
(C) (C) and (D) only
(D) (A) and (B) only

**Answer: (C) (C) and (D) only** · Key from source paper

---

**Q43** JEE Main 2025 · 24 Jan · Shift 2 MCQ

For hydrogen atom, the orbital/s with lowest energy is/are : (A) 4 s (B) $3\mathrm{p}_x$ (C) $3\,\mathrm{d}_{x^2-y^2}$ (D) $3\,\mathrm{d}_{z^2}$ (E) $4\mathrm{p}_z$ Choose the correct answer from the options given below :

(A) (B), (C) and (D) only
(B) (A) and (E) only
(C) (A) only
(D) (B) only

**Answer: (A) (B), (C) and (D) only** · Key from source paper

---

**Q44** JEE Main 2025 · 23 Jan · Shift 1 MCQ

Heat treatment of muscular pain involves radiation of wavelength of about 900 nm . Which spectral line of H atom is suitable for this? Given : Rydberg constant $\mathrm{R_H} = 10^5\ \mathrm{cm}^{-1}$, $\mathrm{h} = 6.6 \times 10^{-34}\ \mathrm{J\,s}, \mathrm{c} = 3 \times 10^8\ \mathrm{m/s}$ )

(A) Balmer series, $\infty \rightarrow 2$
(B) Lyman series, $\infty \rightarrow 1$
(C) Paschen series, $\infty \rightarrow 3$
(D) Paschen series, $5 \rightarrow 3$

**Answer: (C) Paschen series, $\infty \rightarrow 3$** · Key from source paper

**Q45** JEE Main 2025 · 23 Jan · Shift 2 MCQ

Given below are two statements : Statement (I) : For a given shell, the total number of allowed orbitals is given by $\mathrm{n}^2$. Statement (II) : For any subshell, the spatial orientation of the orbitals is given by $-l$ to $+l$ values including zero. In the light of the above statements, choose the correct answer from the options given below :

(A) Both Statement I and Statement II are false
(B) Statement I is true but Statement II is false
(C) Both Statement I and Statement II are true
(D) Statement I is false but Statement II is true

**Answer: (C) Both Statement I and Statement II are true** · Key from source paper

**Q46** JEE Main 2025 · 22 Jan · Shift 1 MCQ

Radius of the first excited state of Helium ion is given as : $a_0 \rightarrow$ radius of first stationary state of hydrogen atom.

(A) r = $4a_0$
(B) r = $2a_0$
(C) $r = \frac{a_0}{2}$
(D) $r = \frac{a_0}{4}$

**Answer: (B)** r = $2a_0$ · Key from source paper

**Q47** JEE Main 2025 · 22 Jan · Shift 2 MCQ

Given below are two statements : Statement (I) : A spectral line will be observed for a $2\mathrm{p}_x \rightarrow 2\mathrm{p}_y$ transition. Statement (II) : $2P_x$ and $2\mathrm{p}_y$ are degenerate orbitals. In the light of the above statements, choose the correct answer from the options given below :

(A) Both Statement I and Statement II are true
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are false
(D) Statement I is true but Statement II is false

**Answer: (B) Statement I is false but Statement II is true** · Key from source paper

**Q48** JEE Main 2024 · 9 Apr · Shift 1 MCQ

Compare the energies of following sets of quantum numbers for multielectron system. (A) n = 4, $l$ = 1 (B) n = 4, $l$ = 2 (C) n = 3, $l$ = 1 (D) n = 3, $l$ = 2 (E) n = 4, $l$ = 0 Choose the correct answer from the options given below :

(A) (B) > (A) > (C) > (E) > (D)

(B) (E) < ( C ) < (D) < ( A ) < ( B )

(C) (E) > ( C ) > ( A ) > ( D ) > (B)

(D) (C) < (E) < (D) < (A) < (B)

**Answer: (D)** (C) < (E) < (D) < (A) < (B) · Key from source paper

---

**Q49** JEE Main 2024 · 9 Apr · Shift 2 MCQ

Match List I with List II

| List - I (Element) | List - II (Electronic configuration) |
|---|---|
| A. N | I. $[\mathrm{Ar}]3\,d^{10}4\,s^2 4p^5\ \mathrm{AR}$ |
| B. S | II. $[\mathrm{Ne}]3\,s^2 3p^4$ |
| C. Br | III. $[\mathrm{He}]2\,s^2 2p^3$ |
| D. Kr | IV. $[\mathrm{Ar}]3\,d^{10}4\,s^2 4p^6$ |

Choose the correct answer from the options given below:

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

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

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

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

**Answer: (A)** A-III, B-II, C-I, D-IV · Key from source paper

---

**Q50** JEE Main 2024 · 9 Apr · Shift 2 Numerical

Based on Heisenberg's uncertainty principle, the uncertainty in the velocity of the electron to be found within an atomic nucleus of diameter $10^{-15}$ m is _____ . $10^9$ $\mathrm{ms}^{-1}$ (nearest integer) [Given : mass of electron = $9.1 \times 10^{-31}$ kg, Plank's constant ($h$) = $6.626 \times 10^{-34}$Js] (Value of $\pi$ = 3.14)

Numerical value type: the answer is a number.

**Answer: 58.** · Key from source paper

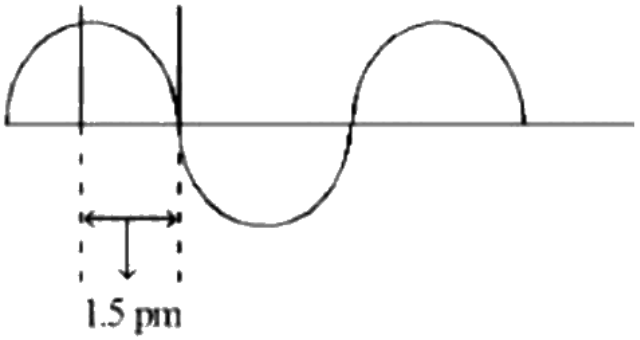
---

**Q51** JEE Main 2024 · 8 Apr · Shift 1 Numerical

*see figure*

EdLoop JEE

**Q51.**




A hypothetical electromagnetic wave is show below.

The frequency of the wave is $x \times 10^{19}$ Hz. $x =$ _____ (nearest integer)

Numerical value type: the answer is a number.

**Answer: 5.** · Key from source paper

---

**Q52** JEE Main 2024 · 8 Apr · Shift 2 Numerical

Wavenumber for a radiation having $5800\ \tilde{A}$ ... wavelength is $x \times 10\ \mathrm{cm}^{-1}$. The value of $x$ is _____ (Integer answer)

Numerical value type: the answer is a number.

**Answer: 1724.** · Key from source paper

---

**Q53** JEE Main 2024 · 6 Apr · Shift 1 Numerical

Frequency of the de-Broglie wave of electron in Bohr's first orbit of hydrogen atom is _____ $\times 10^{13}$ Hz (nearest integer). [Given : $R_H$( Rydberg constant ) = $2.18 \times 10^{-18}$ J, $h$ (Plank's constant ) = $6.6 \times 10^{-34}$ J.s.]

Numerical value type: the answer is a number.

**Answer: 661.** · Key from source paper

---

**Q54** JEE Main 2024 · 6 Apr · Shift 2 Numerical

For hydrogen atom, energy of an electron in first excited state is $-3.4$eV, K. E. of the same electron of hydrogen atom is $x$eV. Value of $x$ is _____ $\times 10^{-1}$eV. (Nearest integer)

Numerical value type: the answer is a number.

**Answer: 34.** · Key from source paper

---

**Q55** JEE Main 2024 · 5 Apr · Shift 1 Numerical

The value of Rydberg constant ($R_H$) is $2.18 \times 10^{-18}$ J. The velocity of electron having mass $9.1 \times 10^{-31}$ kg in Bohr's first orbit of hydrogen atom = _____ $\times 10^5\ \mathrm{ms}^{-1}$ (nearest integer).

Numerical value type: the answer is a number.

**Answer: 22.** · Key from source paper

**Q56** JEE Main 2024 · 5 Apr · Shift 2 Numerical

In an atom, total number of electrons having quantum numbers n = 4, $|m_l| = 1$ and $m_s = -\frac{1}{2}$ is _____

Numerical value type: the answer is a number.

**Answer: 6.** · Key from source paper

**Q57** JEE Main 2024 · 4 Apr · Shift 1 Numerical

The de-Broglie's wavelength of an electron in the $4^{th}$ orbit is _____ $\pi a_0$ . ($a_0$ = Bohr's radius )

Numerical value type: the answer is a number.

**Answer: 8.** · Key from source paper

**Q58** JEE Main 2024 · 4 Apr · Shift 2 Numerical

The maximum number of orbitals which can be identified with n = 4 and $m_l$ = 0 is _____

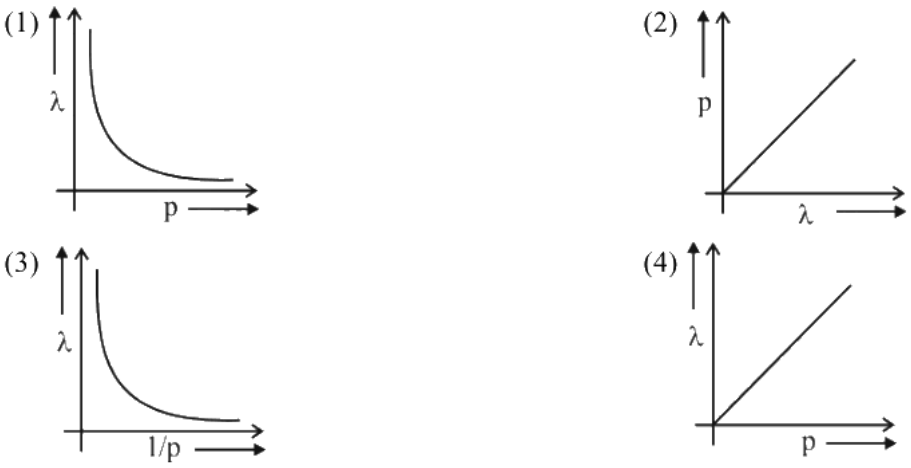
Numerical value type: the answer is a number.

**Answer: 4.** · Key from source paper

**Q59** JEE Main 2024 · 1 Feb · Shift 1 MCQ

According to the wave-particle duality of matter by de-Broglie, which of the following graph plot presents most appropriate relationship between wavelength of electron λ and momentum of electron p ?

**Q31.** According to the wave-particle duality of matter by de-Broglie, which of the following graph plot presents most appropriate relationship between wavelength of electron λ and momentum of electron p ?



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

**Answer: (A)** · Key from source paper

---

**Q60** JEE Main 2024 · 1 Feb · Shift 2 MCQ

The number of radial node/s for 3p orbital is:

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

**Answer: (A) 1** · Key from source paper

---

**Q61** JEE Main 2024 · 31 Jan · Shift 1 Numerical

The ionization energy of sodium in kJ $mol^{-1}$. If electromagnetic radiation of wavelength 242 nm is just sufficient to ionize sodium atom is _____ (nearest integer).

Numerical value type: the answer is a number.

**Answer: 494.** · Key from source paper

---

**Q62** JEE Main 2024 · 31 Jan · Shift 2 MCQ

The four quantum numbers for the electron in the outer most orbital of potassium (atomic no. 19) are

(A) n = 4, l = 2, m = $-1$, s = $+\frac{1}{2}$
(B) n = 4, l = 0, m = 0, s = $+\frac{1}{2}$
(C) n = 3, l = 0, m = $-1$, s = $+\frac{1}{2}$
(D) n = 2, l = 0, m = 0, s = $+\frac{1}{2}$

**Answer: (B)** n = 4, l = 0, m = 0, s = $+\frac{1}{2}$ · Key from source paper

---

**Q63** JEE Main 2024 · 30 Jan · Shift 1 MCQ

Given below are two statements:

Statement-I: The orbitals having same energy are called as degenerate orbitals.

Statement-II: In hydrogen atom, 3p and 3 d orbitals are not degenerate orbitals.

In the light of the above statements, choose the most appropriate answer from the options given

(A) Statement-I is true but Statement-II is false
(B) Both Statement-I and Statement-II are true.
(C) Both Statement-I and Statement-II are false
(D) Statement-I is false but Statement-II is true

**Answer: (A) Statement-I is true but Statement-II is false** · Key from source paper

---

**Q64** JEE Main 2024 · 30 Jan · Shift 2 Numerical

Number of spectral lines obtained in $He^+$ spectra, when an electron makes transition from fifth excited state to first excited state will be

Numerical value type: the answer is a number.

**Answer: 10.** · Key from source paper

---

**Q65** JEE Main 2024 · 29 Jan · Shift 1 MCQ

The correct set of four quantum numbers for the valence electron of rubidium atom ($Z$ = 37) is:

(A) 5, 0, 0, $+\frac{1}{2}$
(B) 5, 0, 1, $+\frac{1}{2}$
(C) 5, 1, 0, $+\frac{1}{2}$
(D) 5, 1, 1, $+\frac{1}{2}$

**Answer: (A) 5, 0, 0, $+\frac{1}{2}$** · Key from source paper

---

**Q66** JEE Main 2024 · 29 Jan · Shift 2 MCQ

Match List I with List II

| List I (Spectral Series for Hydrogen) | | List II (Spectral Region/Higher Energy State) | |
|---|---|---|---|
| A. | Lyman | I. | Infrared region |
| B. | Balmer | II. | UV region |
| C. | Paschen | III. | Infrared region |
| D. | Pfund | IV. | Visible region |

Choose the correct answer from the options given below :-

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

**Answer: (C) A-II, B-IV, C-III, D-I** · Key from source paper

EdLoop JEE

**Q67** JEE Main 2024 · 27 Jan · Shift 1 Numerical

The number of electrons present in all the completely filled subshells having n = 4 and s = $+\frac{1}{2}$ is _____

(Where n = principal quantum number and s = spin quantum number)

Numerical value type: the answer is a number.

**Answer: 16.** · Key from source paper

**Q68** JEE Main 2024 · 27 Jan · Shift 2 Numerical

Total number of ions from the following with noble gas configuration is

$Sr^{2+}$ (Z = 38), $Cs^{+}$ (Z = 55), $La^{2+}$ (Z = 57), $Pb^{2+}$ (Z = 82), $Yb^{2+}$ (Z = 70) and $Fe^{2+}$ (Z = 26)

Numerical value type: the answer is a number.

**Answer: 2.** · Key from source paper

**Q69** JEE Main 2023 · 15 Apr · Shift 1 MCQ

Given below are two statements
Statement I : According to Bohr's model of hydrogen atom, the angular momentum of an electron in a given stationary state is quantised.
Statement II : The concept of electron in Bohr's orbit, violates the Heisenberg uncertainty principle. In the light of the above statements, choose the most appropriate answer from the options given below

(A) Statement I is incorrect but Statement II is correct
(B) Both Statement I and Statement II are correct
(C) Both Statement I and Statement II are incorrect
(D) Statement I is correct but Statement II is incorrect

**Answer: (B) Both Statement I and Statement II are correct** · Key from source paper

**Q70** JEE Main 2023 · 15 Apr · Shift 1 Numerical

The total number of isoelectronic species from the given set is _____.
$O^{2-}$, $F^{-}$, Al, $Mg^{2+}$, $Na^{+}$, $O^{+}$, Mg, $Al^{3+}$, F

Numerical value type: the answer is a number.

**Answer: 5.** · Key from source paper

**Q71** JEE Main 2023 · 13 Apr · Shift 1 MCQ

The energy of an electron in the first Bohr orbit of hydrogen atom is $-2.18 \times 10^{-18}$ J Its energy in the third Bohr orbit is_____.

(A) $\frac{1}{9}$th of the value
(B) $\frac{1}{27}$ of this value
(C) Three times of this value
(D) One third of this value

**Answer: (A) $\frac{1}{9}$th of the value** · Checked by our team

**Q72** JEE Main 2023 · 13 Apr · Shift 2 Numerical

The orbital angular momentum of an electron in 3 s orbital is $\frac{xh}{2\pi}$. The value of x is (nearest integer)

Numerical value type: the answer is a number.

**Answer: 0.** · Key from source paper

**Q73** JEE Main 2023 · 12 Apr · Shift 1 Numerical

Values of work function $(W_0)$ for a few metals are given below
*(see the figure above)*
The number of metals which will show photoelectric effect when light of wavelength 400 nm falls on it is _____
Given: $h = 6.6 \times 10^{-34}$ J s
$c = 3 \times 10^8$ $ms^{-1}$
$e = 1.6 \times 10^{-19}$ C

**Q33.** Values of work function $(W_0)$ for a few metals are given below

| Metal | Li | Na | K | Mg | Cu | Ag |
|---|---|---|---|---|---|---|
| $\frac{W_0}{eV}$ | 2.42 | 2.3 | 2.25 | 3.7 | 4.8 | 4.3 |

The number of metals which will show photoelectric effect when light of wavelength 400 nm falls on it is _____
Given: $h = 6.6 \times 10^{-34}$ J s
$c = 3 \times 10^8$ $ms^{-1}$
$e = 1.6 \times 10^{-19}$ C

Numerical value type: the answer is a number.

**Answer: 3.** · Key from source paper

**Q74** JEE Main 2023 · 11 Apr · Shift 1 MCQ

Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R :
Assertion A: In the photoelectric effect, the electrons are ejected from the metal surface as soon as the beam of light of frequency greater than threshold frequency strikes the surface.
Reason R : When the photon of any energy strikes an electron in the atom, transfer of energy from the photon to the electron takes place.
In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both A and R are correct and R is the correct explanation of A
(B) A is correct but R is not correct
(C) Both A and R are correct but R is NOT the correct explanation of A
(D) A is not correct but R is correct

**Answer: (B) A is correct but R is not correct** · Key from source paper

## Q75 JEE Main 2023 · 11 Apr · Shift 2 Numerical

The number of correct statements from the following is _____
A. For 1s orbital, the probability density is maximum at the nucleus
B. For 2s orbital, the probability density first increases to maximum and then decreases sharply to zero.
C. Boundary surface diagrams of the orbitals encloses a region of 100% probability of finding the electron.
D. p and d-orbitals have 1 and 2 angular nodes respectively
E. probability density of p-orbital is zero at the nucleus

Numerical value type: the answer is a number.

**Answer: 3.** · Key from source paper

## Q76 JEE Main 2023 · 10 Apr · Shift 1 Numerical

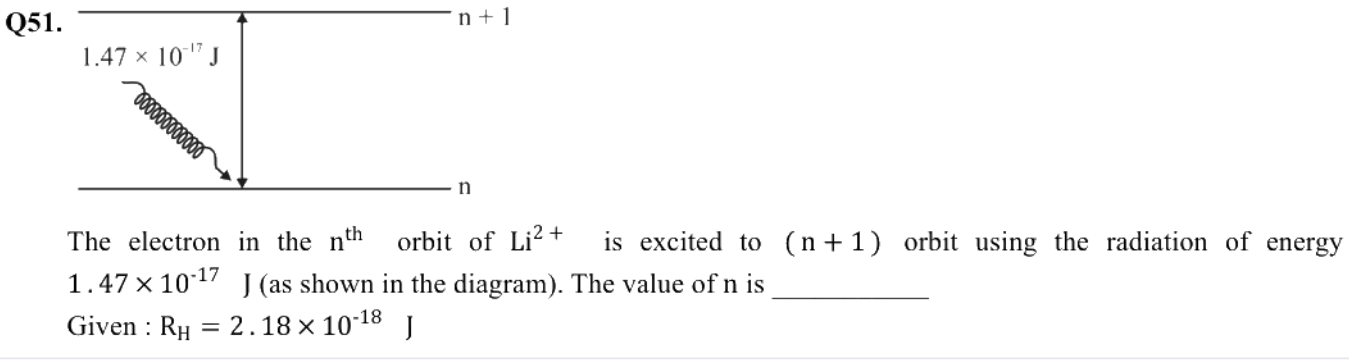
The number of incorrect statement/s about the black body from the following is _____
(A) Emit or absorb energy in the form of electromagnetic radiation.
(B) Frequency distribution of the emitted radiation depends on temperature.
(C) At a given temperature, intensity vs frequency curve passes through a maximum value.
(D) The maximum of the intensity vs frequency curve is at a higher frequency at higher temperature compared to that at lower temperature.

Numerical value type: the answer is a number.

**Answer: 0.** · Key from source paper

## Q77 JEE Main 2023 · 10 Apr · Shift 2 Numerical

*see figure*




The electron in the $n^{th}$ orbit of $Li^{2+}$ is excited to $(n+1)$ orbit using the radiation of energy $1.47 \times 10^{-17}$ J (as shown in the diagram). The value of n is _____
Given : $R_H = 2.18 \times 10^{-18}$ J

Numerical value type: the answer is a number.

**Answer: 1.** · Key from source paper

**Q78** JEE Main 2023 · 8 Apr · Shift 1 Numerical

The number of following statement/s which is/are incorrect is _____

A) Line emission spectra are used to study the electronic structure

B) The emission spectra of atoms in the gas phase show a continuous spread of wavelength from red to violet.

C) An absorption spectrum is like the photographic negative of an emission spectrum

D) The element helium was discovered in the sun by spectroscopic method

Numerical value type: the answer is a number.

**Answer: 1.** · Key from source paper

**Q79** JEE Main 2023 · 8 Apr · Shift 2 Numerical

The number of atomic orbitals from the following having 5 radial nodes is

7s, 7p, 6s, 8p, 8d

Numerical value type: the answer is a number.

**Answer: 3.** · Key from source paper

**Q80** JEE Main 2023 · 6 Apr · Shift 1 Numerical

The wavelength of an electron of kinetic energy $4.50 \times 10^{-29}$ J is _____ $\times 10^{-5}$ m. (Nearest integer)

Given: mass of electron is $9 \times 10^{-31}$ kg, $h = 6.6 \times 10^{-34}$ Js

Numerical value type: the answer is a number.

**Answer: 7.** · Key from source paper

**Q81** JEE Main 2023 · 6 Apr · Shift 2 MCQ

If the radius of the first orbit of hydrogen atom is $a_0$, then de Broglie's wavelength of electron in $3^{\text{rd}}$ orbit is

(A) $\frac{\pi a_0}{6}$

(B) $\frac{\pi a_0}{3}$

(C) $6\pi a_0$

(D) $3\pi a_0$

**Answer: (C)** $6\pi a_0$ · Key from source paper

**Q82** JEE Main 2023 · 1 Feb · Shift 1 Numerical

Electrons in a cathode ray tube have been emitted with a velocity of 1000 $\text{ms}^{-1}$. The number of following statements which is/are true about the emitted radiation is

Given : h = $6 \times 10^{-34}$Js, $m_e$ = $9 \times 10^{-31}$ kg
(A ) The deBroglie wavelength of the electron emitted is 666.67 nm
(B ) The characteristic of electrons emitted depend upon the material of the electrodes of the cathode ray tube.
(C) The cathode rays start from cathode and move towards anode.
(D ) The nature of the emitted electrons depends on the nature of the gas present in cathode ray tube..

Numerical value type: the answer is a number.

**Answer: 2.** · Key from source paper

---

**Q83** JEE Main 2023 · 1 Feb · Shift 2 MCQ

Which one of the following sets of ions represents a collection of isoelectronic species?
(Given : Atomic Number : F : 9, Cl : 17, Na = 11 Mg = 12, Al = 13, K = 19, Ca = 20, Sc = 21)

(A) $(Li^+, Na^+, Mg^{2+}, Ca^{2+}$
(B) $(Ba^{2+}, Sr^{2+}, K+, Ca^{2+}$
(C) $(N^{3-}, O^{2-}, F^-, S^{2-}$
(D) $(K^+, Cl^-, Ca^{2+}, Sc^{3+}$

**Answer: (D)** $(K^+, Cl^-, Ca^{2+}, Sc^{3+}$ · Key from source paper

---

**Q84** JEE Main 2023 · 31 Jan · Shift 1 MCQ

Which transition in the hydrogen spectrum would have the same wavelength as the Balmer type transition from n = 4 to n = 2 of $He^+$ spectrum

(A) n = 2 to n = 1
(B) n = 1 to n = 3
(C) n = 1 to n = 2
(D) n = 3 to n = 4

**Answer: (A)** n = 2 to n = 1 · Key from source paper

---

**Q85** JEE Main 2023 · 31 Jan · Shift 2 MCQ

Arrange the following orbitals in decreasing order of energy.
A. n = 3, l = 0, m = 0
B. n = 4, l = 0, m = 0
C. n = 3, l = 1, m = 0
D. n = 3, l = 2, m = 1
The correct option for the order is:

(A) D > B > C > A
(B) B > D > C > A
(C) A > C > B > D
(D) D > B > A > C

**Answer: (A)** D > B > C > A · Key from source paper

---

**Q86** JEE Main 2023 · 30 Jan · Shift 1 Numerical

The energy of one mole of photons of radiation of frequency $2 \times 10^{12}$ Hz in J mol$^{-1}$ is _____ .
(Nearest integer)
(Given: h = $6.626 \times 10^{-34}$ J s $N_A = 6.022 \times 10^{23}$ mol$^{-1}$)

Numerical value type: the answer is a number.

**Answer: 798.** · Key from source paper

---

**Q87** JEE Main 2023 · 30 Jan · Shift 2 MCQ

The wave function ($\Psi$) of 2 s is given by
$\Psi_{2s} = \frac{1}{2\sqrt{2\pi}} \left(\frac{1}{a_0}\right)^{1/2} \left(2 - \frac{r}{a_0}\right) e^{-r/2a_0}$
At r = $r_0$, radial node is formed. Thus, $r_0$ in terms of $a_0$

(A) $r_0 = a_0$
(B) $r_0 = 4a_0$
(C) $r_0 = \frac{a_0}{2}$
(D) $r_0 = 2a_0$

**Answer: (D)** $r_0 = 2a_0$ · Key from source paper

---

**Q88** JEE Main 2023 · 30 Jan · Shift 2 MCQ

Maximum number of electrons that can be accommodated in shell with $n$ = 4 are:

(A) 16
(B) 32
(C) 50
(D) 72

**Answer: (B)** 32 · Key from source paper

---

**Q89** JEE Main 2023 · 29 Jan · Shift 1 MCQ

The shortest wavelength of hydrogen atom in Lyman series is $\lambda$. The longest wavelength in Balmer series of $He^+$ is

(A) $\frac{5}{9\lambda}$
(B) $\frac{9\lambda}{5}$
(C) $\frac{36\lambda}{5}$
(D) $\frac{5\lambda}{9}$

**Answer: (B)** $\frac{9\lambda}{5}$ · Key from source paper

---

**Q90** JEE Main 2023 · 29 Jan · Shift 2 Numerical

Assume that the radius of the first Bohr orbit of hydrogen atom is $0.6\ \text{Å}$. The radius of the third Bohr orbit of $He^+$ is _____ picometer. (Nearest Integer)

Numerical value type: the answer is a number.

**Answer: 270.** · Key from source paper

---

**Q91** JEE Main 2023 · 25 Jan · Shift 1 MCQ

The radius of the $2^{nd}$ orbit of $Li^{2+}$ is x. The expected radius of the $3^{rd}$ orbit of $Be^{3+}$ is

(A) $\frac{9}{4}$x
(B) $\frac{4}{9}$x
(C) $\frac{27}{16}$x
(D) $\frac{16}{27}$x

**Answer: (C)** $\frac{27}{16}$x · Key from source paper

---

**Q92** JEE Main 2023 · 25 Jan · Shift 2 Numerical

The number of given orbitals which have electron density along the axis is

$p_x, p_y, p_z, d_{xy}, d_{yz}, d_{xz}, d_{z^2}, d_{x^2-y^2}$

Numerical value type: the answer is a number.

**Answer: 5.** · Key from source paper

---

**Q93** JEE Main 2023 · 24 Jan · Shift 1 Numerical

If wavelength of the first line of the Paschen series of hydrogen atom is 720 nm, then the wavelength of the second line of this series is _____ nm. (Nearest integer)

Numerical value type: the answer is a number.

**Answer: 492.** · Key from source paper

---

**Q94** JEE Main 2023 · 24 Jan · Shift 2 Numerical

Following figure shows spectrum of an ideal black body at four different temperatures. The number of correct statement/s from the following is _____.

*(see the figure above)*

A. $T_4 > T_3 > T_2 > T_1$

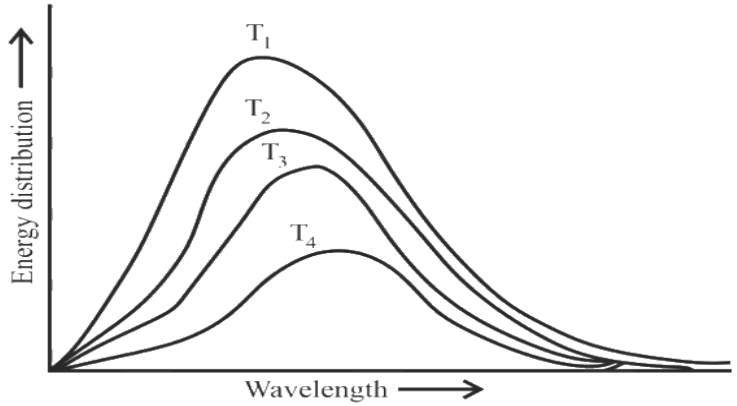
B. The black body consists of particles performing simple harmonic motion.

C. The peak of the spectrum shifts to shorter wavelength as temperature increases.

D. $\frac{T_1}{V_1} = \frac{T_2}{V_2} = \frac{T_3}{V_3}$

E. The given spectrum could be explained using quantisation of energy

**Q31.** Following figure shows spectrum of an ideal black body at four different temperatures. The number of correct statement/s from the following is _____.




A. $T_4 > T_3 > T_2 > T_1$

B. The black body consists of particles performing simple harmonic motion.

C. The peak of the spectrum shifts to shorter wavelength as temperature increases.

D. $\frac{T_1}{v_1} = \frac{T_2}{v_2} = \frac{T_3}{v_3}$

E. The given spectrum could be explained using quantisation of energy

Numerical value type: the answer is a number.

**Answer: 2.** · Key from source paper

## Q95 JEE Main 2023 · 24 Jan · Shift 2 MCQ

The number of s-electrons present in an ion with 55 protons in its unipositive state is

(A) 8

(B) 9

(C) 12

(D) 10

**Answer: (D) 10** · Key from source paper

## Q96 JEE Main 2022 · 29 Jul · Shift 1 Numerical

The minimum uncertainty in the speed of an electron in one dimensional region of length $2a_o$ (Where $a_o$ = Bohr radius 52.9 pm) is _____ $kms^{-1}$ (Nearest integer) (Given : Mass of electron = $9.1 \times 10^{-31}$ kg, Planck's constant h = $6.63 \times 10^{-34}$ Js)

Numerical value type: the answer is a number.

**Answer: 548.** · Key from source paper

**Q97** JEE Main 2022 · 29 Jul · Shift 2 MCQ

Given below are the quantum numbers for 4 electrons.
A. $n = 3, l = 2, m_l = 1, m_s = +\frac{1}{2}$
B. $n = 4, l = 1, m_l = 0, m_s = +\frac{1}{2}$
C. $n = 4, l = 2, m_l = -2, m_s = -\frac{1}{2}$
D. $n = 3, l = 1, m_l = -1, m_s = +\frac{1}{2}$
The correct order of increasing energy is

(A) D < B < A < C
(B) D < A < B < C
(C) B < D < A < C
(D) B < D < C < A

**Answer: (B)** D < A < B < C · Key from source paper

**Q98** JEE Main 2022 · 28 Jul · Shift 1 MCQ

Identify the incorrect statement from the following.

(A) A circular path around the nucleus in which an electron moves is proposed as Bohr's orbit.
(B) An orbital is the one electron wave function
(C) The existence of Bohr's orbits is supported by hydrogen spectrum.
(D) Atomic orbital is characterised by the quantum numbers n and l only

**Answer: (D)** Atomic orbital is characterised by the quantum numbers n and l only · Key from source paper

**Q99** JEE Main 2022 · 28 Jul · Shift 2 Numerical

If the wavelength for an electron emitted from $\mathrm{H}-$ atom is $3.3 \times 10^{-10}\ \mathrm{m}$, then energy absorbed by the electron in its ground state compared to minimum energy required for its escape from the atom, is _____ times.
[Given : $\mathrm{h} = 6.626 \times 10^{-34}\ \mathrm{Js}$, Mass of electron $= 9.1 \times 10^{-31}$]

Numerical value type: the answer is a number.

**Answer: 2.** · Key from source paper

**Q100** JEE Main 2022 · 27 Jul · Shift 1 MCQ

Given below are two statements. One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : Energy of 2 s orbital of hydrogen atom is greater than that of 2 s orbital of lithium.
Reason R : Energies of the orbitals in the same subshell decrease with increase in the atomic number.
In the light of the above statements, choose the correct answer from the options given below.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is NOT the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

**Answer: (A) Both A and R are true and R is the correct explanation of A.** · Key from source paper

---

**Q101** JEE Main 2022 · 27 Jul · Shift 2 MCQ

The correct decreasing order of energy, for the orbitals having, following set of quantum numbers:
(A) n = 3, l = 0, m = 0
(B) n = 4, l = 0, m = 0
(C) n = 3, l = 1, m = 0
(D) n = 3, l = 2, m = 1

(A) (D) > (B) > (C) > (A)
(B) (B) > (D) > (C) > (A)
(C) (C) > (B) > (D) > (A)
(D) (B) > (C) > (D) > (A)

**Answer: (A) (D) > (B) > (C) > (A)** · Key from source paper

---

**Q102** JEE Main 2022 · 26 Jul · Shift 1 Numerical

The wavelength of an electron and a neutron will become equal when the velocity of the electron is x times the velocity of neutron. The value of x is _____ (the nearest integer)(Mass of electron is $9.1 \times 10^{-31}$ kg and mass of neutron is $1.6 \times 10^{-27}$ kg)

Numerical value type: the answer is a number.

**Answer: 1758.** · Key from source paper

---

**Q103** JEE Main 2022 · 26 Jul · Shift 2 Numerical

Consider an imaginary ion $^{48}_{22}X^{3-}$. The nucleus contains 'a' % more neutrons than the number of electrons in the ion. The value of 'a' is

Numerical value type: the answer is a number.

**Answer: 4.** · Key from source paper

---

**Q104** JEE Main 2022 · 25 Jul · Shift 1 MCQ

Which of the following sets of quantum numbers is not allowed?

(A) $\mathrm{n}=3,\ \mathrm{l}=2,\ \mathrm{m_l}=0,\ \mathrm{s}=+\frac{1}{2}$
(B) $\mathrm{n}=3,\ \mathrm{l}=2,\ \mathrm{m_l}=-2,\ \mathrm{s}=+\frac{1}{2}$
(C) $\mathrm{n}=3,\ \mathrm{l}=3,\ \mathrm{m_l}=-3,\ \mathrm{s}=-\frac{1}{2}$
(D) $\mathrm{n}=3,\ \mathrm{l}=0,\ \mathrm{m_l}=0,\ \mathrm{s}=-\frac{1}{2}$

**Answer: (C)** $\mathrm{n}=3,\ \mathrm{l}=3,\ \mathrm{m_l}=-3,\ \mathrm{s}=-\frac{1}{2}$ · Key from source paper

---

**Q105** JEE Main 2022 · 25 Jul · Shift 2 · Numerical

When the excited electron of a H atom from $n=5$ drops to the ground state, the maximum number of emission lines observed are

Numerical value type: the answer is a number.

**Answer: 10.** · Key from source paper

---

**Q106** JEE Main 2022 · 29 Jun · Shift 1 · MCQ

Which of the following statements are correct?
(A) The electronic configuration of Cr is $[\mathrm{Ar}]\ 3\mathrm{d}^5 4\mathrm{s}^1$.
(B) The magnetic quantum number may have a negative value.
(C) In the ground state of an atom, the orbitals are filled in order of their increasing energy order.
(D) The total number of nodes are given by $\mathrm{n}-2$.
Choose the most appropriate answer from the options given below.

(A) (A), (C) & (D) only
(B) (A) & (B) only
(C) (A) & (C) only
(D) (A), (B) & (C) only

**Answer: (D)** (A), (B) & (C) only · Key from source paper

---

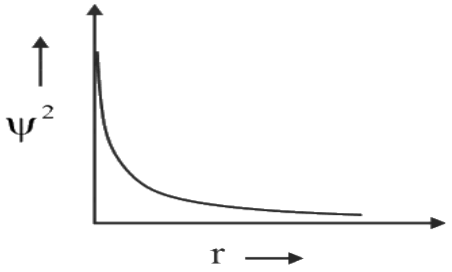
**Q107** JEE Main 2022 · 29 Jun · Shift 2 · MCQ

Which of the following is the correct plot for the probability density $\psi^2(\mathrm{r})$ as a function of distance 'r' of the electron form the nucleus for 2s orbital?

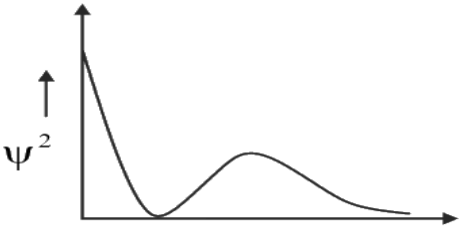
*(see the figure above)*

**Q32.** Which of the following is the correct plot for the probability density $\psi^2(r)$ as a function of distance 'r' of the electron form the nucleus for 2s orbital?

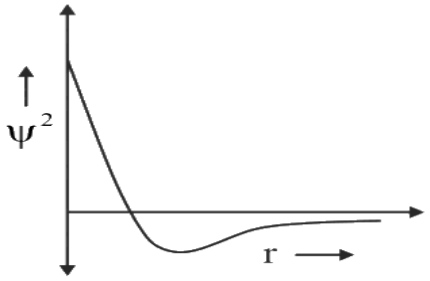
(1)



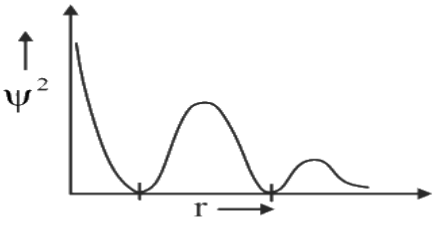

(2)




(3)




(4)




(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

**Answer: (B)** · Key from source paper

## Q108 JEE Main 2022 · 28 Jun · Shift 1 Numerical

If the work function of a metal is $6.63 \times 10^{-19}$ J, the maximum wavelength of the photon required to remove a photoelectron from the metal is _____ nm. Nearest integer)

[Given : h $= 6.63 \times 10^{-34}$ J s, and c $= 3 \times 10^{8}$ m s$^{-1}$]

Numerical value type: the answer is a number.

**Answer: 300.** · Key from source paper

## Q109 JEE Main 2022 · 28 Jun · Shift 2 MCQ

Consider the following statements :

(A) The principal quantum number 'n' is a positive integer with values of 'n' $= 1, 2, 3, \ldots$

(B) The azimuthal quantum number 'l' for a given 'n' (principal quantum number) can have values as 'l' $= 0, 1, 2, \ldots . n$ has $(2n + 1)$ values.

(C) Magnetic orbital quantum number 'm' for a particular 'l' (azimuthal quantum number) has $(2l + 1)$ values.

(D) $\pm\frac{1}{2}$ are the two possible orientations of electron spin.

(E) For l = 5, there will be a total of 9 orbital

Which of the above statements are correct?

(A) (A), (B) & (C)
(B) (A), (C), (D)& (E)
(C) (A), (C) & (D)
(D) (A), (B), (C) & (D)

**Answer: (C)** (A), (C) & (D) · Key from source paper

**Q110** JEE Main 2022 · 27 Jun · Shift 1 Numerical

If the uncertainty in velocity and position of a minute particle in space are, $2.4 \times 10^{-26}\ \left(\mathrm{ms}^{-1}\right)$ and $10^{-7}\ (\mathrm{m})$ respectively. The mass of the particle in g is _____ (Nearest integer)
(Given : h = $6.626 \times 10^{-34}$ Js)

Numerical value type: the answer is a number.

**Answer: 22.** · Key from source paper

**Q111** JEE Main 2022 · 27 Jun · Shift 2 Numerical

Consider the following set of quantum numbers.
*(see the figure above)*
The number of correct sets of quantum numbers is

**Q52.** Consider the following set of quantum numbers.

| | n | l | $m_l$ |
|---|---|---|---|
| A | 3 | 3 | $-3$ |
| B | 3 | 2 | $-2$ |
| C | 2 | 1 | $+1$ |
| D | 2 | 2 | $+2$ |

The number of correct sets of quantum numbers is

Numerical value type: the answer is a number.

**Answer: 2.** · Key from source paper

**Q112** JEE Main 2022 · 26 Jun · Shift 1 MCQ

If the radius of the $3^{\mathrm{rd}}$ Bohr's orbit of hydrogen atom is $\mathrm{r}_3$ and the radius of $4^{\mathrm{th}}$ Bohr's orbit is $\mathrm{r}_4$. Then

(A) $r_4 = \frac{9}{16} r_3$
(B) $r_4 = \frac{16}{9} r_3$
(C) $r_4 = \frac{3}{4} r_3$
(D) $r_4 = \frac{4}{3} r_3$

**Answer: (B)** $r_4 = \frac{16}{9} r_3$ · Key from source paper

---

**Q113** JEE Main 2022 · 26 Jun · Shift 2 MCQ

The number of radial and angular nodes in 4d orbital are, respectively

(A) 1 & 2
(B) 3 & 2
(C) 1 & 0
(D) 2 & 1

**Answer: (A)** 1 & 2 · Key from source paper

---

**Q114** JEE Main 2022 · 25 Jun · Shift 1 MCQ

The pair, in which ions are isoelectronic with $Al^{3+}$ is

(A) $Br^-$ and $Be^{2+}$
(B) $Cl^-$ and $Li^+$
(C) $S^{2-}$ and $K^+$
(D) $O^{2-}$ and $Mg^{2+}$

**Answer: (D)** $O^{2-}$ and $Mg^{2+}$ · Key from source paper

---

**Q115** JEE Main 2022 · 25 Jun · Shift 1 Numerical

The longest wavelength of light that can be used for the ionisation of lithium ion $Li^{2+}$ is $x \times 10^{-8}$ m. The value of x is (Nearest Integer)
(Given : Energy of the electron in the first shell of the hydrogen atom is $-2.2 \times 10^{-18}$ J; $h = 6.63 \times 10^{-34}$Js and $c = 3 \times 10^8$ $ms^{-1}$)

Numerical value type: the answer is a number.

**Answer: 1.** · Checked by our team

---

**Q116** JEE Main 2022 · 25 Jun · Shift 2 MCQ

The minimum energy that must be possessed by photons in order to produce the photoelectric effect with platinum metal is:
[Given: The threshold frequency of platinum is $1.3 \times 10^{15}$ $s^{-1}$ and $h = 6.6 \times 10^{-34}$Js]

(A) $8.58 \times 10^{-19}\text{J}$
(B) $9.76 \times 10^{-20}\text{J}$
(C) $3.21 \times 10^{-14}\text{J}$
(D) $6.24 \times 10^{-16}\text{J}$

**Answer: (A)** $8.58 \times 10^{-19}\text{J}$ · Key from source paper

---

**Q117** JEE Main 2022 · 24 Jun · Shift 1 MCQ

Consider the following pairs of electrons
(A) (a) $\text{n} = 3, \text{l} = 1, \text{m}_\text{l} = 1, \text{m}_\text{s} = +\frac{1}{2}$
(b) $\text{n} = 3, \text{l} = 2, \text{m}_\text{l} = 1, \text{m}_\text{s} = +\frac{1}{2}$
(B) (a) $\text{n} = 3, \text{l} = 2, \text{m}_\text{l} = -2, \text{m}_\text{s} = -\frac{1}{2}$
(b) $\text{n} = 3, \text{l} = 2, \text{m}_\text{l} = -1, \text{m}_\text{s} = -\frac{1}{2}$
(C) (a) $\text{n} = 4, \text{l} = 2, \text{m}_\text{l} = 2, \text{m}_\text{s} = +\frac{1}{2}$
(b) $\text{n} = 3, \text{l} = 2, \text{m}_\text{l} = 2, \text{m}_\text{s} = +\frac{1}{2}$
The pairs of electrons present in degenerate orbitals is/are

(A) Only (A)
(B) Only (B)
(C) Only (C)
(D) (B) and (C) both

**Answer: (B)** Only (B) · Key from source paper

---

**Q118** JEE Main 2022 · 24 Jun · Shift 2 MCQ

The energy of one mole of photons of radiation of wavelength $300\ \text{nm}$ is (Given : $\text{h} = 6.63 \times 10^{-34}\ \text{J s}$ , $\text{N}_\text{A} = 6.02 \times 10^{23}\ \text{mol}^{-1}$ $\text{c} = 3 \times 10^{8}\ \text{m s}^{-1}$)

(A) $235\ \text{kJ mol}^{-1}$
(B) $325\ \text{kJ mol}^{-1}$
(C) $399\ \text{kJ mol}^{-1}$
(D) $435\ \text{kJ mol}^{-1}$

**Answer: (C)** $399\ \text{kJ mol}^{-1}$ · Key from source paper

---

**Q119** JEE Main 2021 · 1 Sep · Shift 2 Numerical

A 50 watt bulb emits monochromatic red light of wavelength of 795 nm. The number of photons emitted per second by the bulb is $x \times 10^{20}$. The value of x is _____. (Nearest integer)
[Given : h = $6.63 \times 10^{-34}$Js and $c = 3.0 \times 10^{8}$ $\text{ms}^{-1}$

Numerical value type: the answer is a number.

**Answer: 2.** · Key from source paper

**Q120** JEE Main 2021 · 31 Aug · Shift 1 Numerical

Ge (Z = 32) in its ground state electronic configuration has x completely filled orbitals with $m_l = 0$. The value of x is _____.

Numerical value type: the answer is a number.

**Answer: 7.** · Key from source paper

**Q121** JEE Main 2021 · 31 Aug · Shift 2 Numerical

The value of magnetic quantum number of the outermost electron of $Zn^+$ ion is _____. (Integer answer)

Numerical value type: the answer is a number.

**Answer: 0.** · Key from source paper

**Q122** JEE Main 2021 · 27 Aug · Shift 1 Numerical

The number of $f$ electrons in the ground state electronic configuration of Np(Z = 93) is _____. (Integer answer)

Numerical value type: the answer is a number.

**Accepted answers: 18 or 4.** · Key from source paper

**Q123** JEE Main 2021 · 27 Aug · Shift 1 Numerical

The kinetic energy of an electron in the second Bohr orbit of a hydrogen atom is equal to $\frac{h^2}{x\, ma_0^2}$. The value of 10 x is ($a_0$ is radius of Bohr's orbit)
(Nearest integer)
[Given: $\pi = 3.14$]

Numerical value type: the answer is a number.

**Answer: 3155.** · Key from source paper

**Q124** JEE Main 2021 · 27 Aug · Shift 2 Numerical

The number of photons emitted by a monochromatic (single frequency) infrared range finder of power $1\ \mathrm{mW}$ and wavelength of $1000\ \mathrm{nm}$, in $0.1$ second is $\mathrm{x} \times 10^{13}$. The value of x is (Nearest integer) ($\mathrm{h} = 6.63 \times 10^{-34}$ Js, $\mathrm{c} = 3.00 \times 10^{8}\ \mathrm{ms}^{-1}$):

Numerical value type: the answer is a number.

**Answer: 50.** · Key from source paper

**Q125** JEE Main 2021 · 26 Aug · Shift 1 MCQ

Given below are two statements :
Statement I : According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in positive charges on the nucleus as there is no strong hold on the

electron by the nucleus.
Statement II : According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in principle quantum number.
In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is false but Statement II is true
(B) Statement I is true but Statement II is false
(C) Both Statement I and Statement II are false
(D) Both Statement I and Statement II are true

**Answer: (A) Statement I is false but Statement II is true** · Key from source paper

---

## Q126 JEE Main 2021 · 26 Aug · Shift 2 Numerical

A metal surface is exposed to $500\ \text{nm}$ radiation. The threshold frequency of the metal for photoelectric current is $4.3 \times 10^{14}\ \text{Hz}$. The velocity of ejected electron is $___\times 10^5\ \text{ms}^{-1}$ (Nearest integer)
[Use : h $= 6.63 \times 10^{-34}\ \text{Js}$, $\text{m}_\text{e} = 9.0 \times 10^{-31}\ \text{kg}$]

Numerical value type: the answer is a number.

**Answer: 5.** · Key from source paper

---

## Q127 JEE Main 2021 · 27 Jul · Shift 1 MCQ

Given below are two statements :
Statement I : Rutherford's gold foil experiment cannot explain the line spectrum of hydrogen atom.
Statement II : Bohr's model of hydrogen atom contradicts Heisenberg's uncertainty principle. In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is false but statement II is true.
(B) Statement I is true but statement II is false.
(C) Both statement I and statement II are false.
(D) Both statement I and statement II are true.

**Answer: (D) Both statement I and statement II are true.** · Key from source paper

---

## Q128 JEE Main 2021 · 27 Jul · Shift 2 MCQ

If the Thomson model of the atom was correct, then the result of Rutherford's gold foil experiment would have been:

(A) All of the α-particles pass through the gold foil without decrease in speed.
(B) α-particles are deflected over a wide range of angles.
(C) All α-particles get bounced back by $180^{\circ}$.
(D) α-particles pass through the gold foil deflected by small angles and with reduced speed.

**Answer: (D) α-particles pass through the gold foil deflected by small angles and with reduced speed.** · Key from source paper

---

**Q129** JEE Main 2021 · 25 Jul · Shift 1 Numerical

A source of monochromatic radiation wavelength $400\ \mathrm{nm}$ provides $1000\ \mathrm{J}$ of energy in 10 seconds. When this radiation falls on the surface of sodium, $\mathrm{x} \times 10^{20}$ electrons are ejected per second. Assume that wavelength $400\ \mathrm{nm}$ is sufficient for ejection of electron from the surface of sodium metal. The value of x is _____. (Nearest integer)
$\mathrm{h} = 6.626 \times 10^{-34}\ \mathrm{Js}$

Numerical value type: the answer is a number.

**Answer: 2.** · Key from source paper

---

**Q130** JEE Main 2021 · 25 Jul · Shift 2 Numerical

An accelerated electron has a speed of $5 \times 10^{6}\ \mathrm{ms}^{-1}$ with an uncertainty of $0.02\%$. The uncertainty in finding its location while in motion is $x \times 10^{-9}\ \mathrm{m}$.
The value of $x$ is _____. (Nearest integer)
[Use mass of electron$= 9.1 \times 10^{-31}\ \mathrm{kg}$, h $= 6.63 \times 10^{-34}\ \mathrm{Js}$, $\pi = 3.14$]

Numerical value type: the answer is a number.

**Answer: 58.** · Key from source paper

---

**Q131** JEE Main 2021 · 22 Jul · Shift 1 Numerical

Number of electrons that Vanadium ($Z = 23$) has in p-orbitals is equal to:

Numerical value type: the answer is a number.

**Answer: 12.** · Key from source paper

---

**Q132** JEE Main 2021 · 20 Jul · Shift 1 Numerical

The Azimuthal quantum number for the valence electrons of $\mathrm{Ga}^{+}$ ion is (Atomic number of Ga $= 31$)

Numerical value type: the answer is a number.

**Answer: 0.** · Key from source paper

---

**Q133** JEE Main 2021 · 20 Jul · Shift 2 MCQ

Which one of the following species doesn't have a magnetic moment of $1.73\ \mathrm{BM}$, (spin only value)?

(A) $O_2^+$
(B) $CuI$
(C) $[Cu(NH_3)_4]\ Cl_2$
(D) $O_2^-$

**Answer: (B)** $CuI$ · Key from source paper

---

**Q134** JEE Main 2021 · 20 Jul · Shift 2 Numerical

The wavelength of electrons accelerated from rest through a potential difference of $40\,kV$ is $X \times 10^{-12}$ m. The value of x is. (Nearest integer)
Given: Mass of electron $= 9.1 \times 10^{-31}$ kg
Charge on an electron $= 1.6 \times 10^{-19} C$
Planck's constant $= 6.63 \times 10^{-34}$ Js

Numerical value type: the answer is a number.

**Answer: 6.** · Key from source paper

---

**Q135** JEE Main 2021 · 18 Mar · Shift 1 MCQ

A certain orbital has no angular nodes and two radial nodes. The orbital is:

(A) 2s
(B) 3s
(C) 3p
(D) 2p

**Answer: (B)** 3s · Key from source paper

---

**Q136** JEE Main 2021 · 18 Mar · Shift 2 MCQ

Given below are two statements:
Statement I : Bohr's theory accounts for the stability and line spectrum of $Li^+$ ion.
Statement II : Bohr's theory was unable to explain the splitting of spectral lines in the presence of a magnetic field.
In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Both statement I and statement II are true.
(B) Statement I is false but statement II is true.
(C) Both statement I and statement II are false.
(D) Statement I is true but statement II is false.

**Answer: (B) Statement I is false but statement II is true.** · Key from source paper

**Q137** JEE Main 2021 · 17 Mar · Shift 1 Numerical

A certain orbital has $n = 4$ and $m_l = -3$. The number of radial nodes in this orbital is _____. (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

**Answer: 0.** · Key from source paper

**Q138** JEE Main 2021 · 17 Mar · Shift 2 Numerical

In the ground state of atomic $Fe(Z = 26)$, the spin-only magnetic moment is $\times 10^{-1} BM$. (Round off to the Nearest Integer). [ Given : $\sqrt{3} = 1.73, \sqrt{2} = 1.41$]

Numerical value type: the answer is a number.

**Answer: 49.** · Key from source paper

**Q139** JEE Main 2021 · 16 Mar · Shift 1 Numerical

When light of wavelength 248 nm falls on a metal of threshold energy 3.0 eV, the de-Broglie wavelength of emitted electrons is _____ Å. (Round off to the Nearest Integer).
[Use : $\sqrt{3} = 1.73,\ h = 6.63 \times 10^{-34}\ Js; m_e = 9.1 \times 10^{-31}\ kg; c = 3.0 \times 10^{8}\ ms^{-1}; 1eV = 1.6 \times 10^{-19}\ J$]

Numerical value type: the answer is a number.

**Answer: 9.** · Key from source paper

**Q140** JEE Main 2021 · 16 Mar · Shift 2 Numerical

The number of orbitals with n = 5, $m_l$ = +2 is _____. (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

**Answer: 3.** · Key from source paper

**Q141** JEE Main 2021 · 26 Feb · Shift 1 MCQ

The orbital having two radial as well as two angular nodes is:

(A) 5d
(B) 4d
(C) 4f
(D) 3p

**Answer: (A) 5d** · Key from source paper

**Q142** JEE Main 2021 · 26 Feb · Shift 2 Numerical

A ball weighing $10\ g$ is moving with a velocity of $90\ m\ s^{-1}$. If the uncertainty in its velocity is $5\%$, then the uncertainty in its position is _____ $\times 10^{-33}$ m. (Rounded off to the nearest integer) [Given: h = $6.63 \times 10^{-34}$ Js]

Numerical value type: the answer is a number.

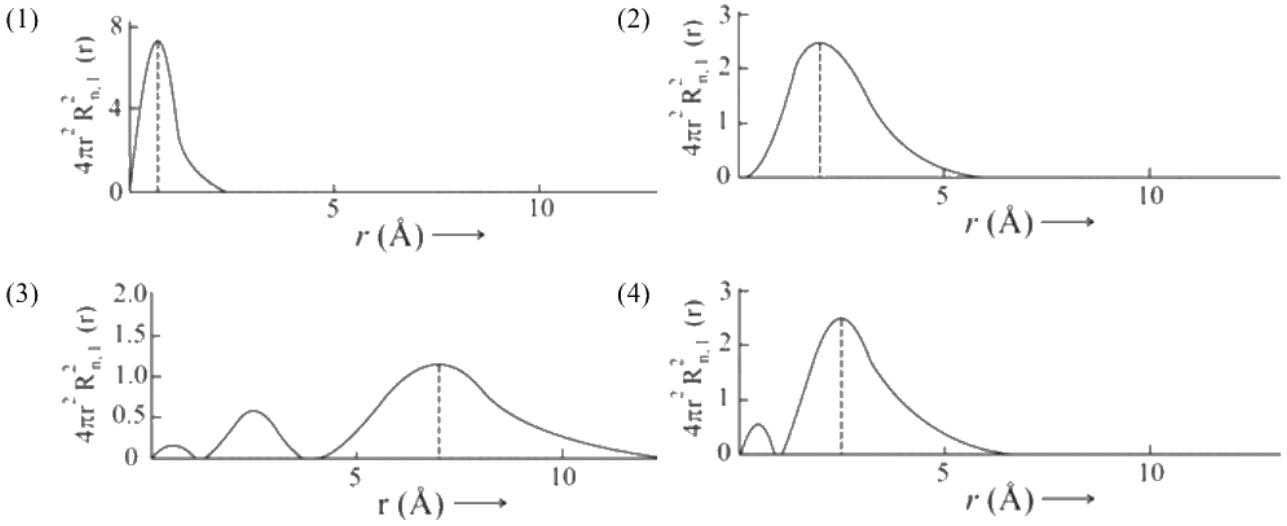
**Answer: 1.** · Key from source paper

## Q143 JEE Main 2021 · 25 Feb · Shift 1 MCQ

The plots of radial distribution functions for various orbitals of hydrogen atom against 'r' are given below. The correct plot for 3s orbital is :

*(see the figure above)*

**Q32.** The plots of radial distribution functions for various orbitals of hydrogen atom against ' $r$ ' are given below. The correct plot for 3s orbital is :




(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

**Answer: (C)** · Key from source paper

## Q144 JEE Main 2021 · 25 Feb · Shift 1 MCQ

In which of the following pairs, the outermost electronic configuration will be the same.

(A) $Cr^{+}$ and $Mn^{2+}$

(B) $Ni^{2+}$ and $Cu^{+}$

(C) $Fe^{2+}$ and $Co^{+}$

(D) $V^{2+}$ and $Cr^{+}$

**Answer: (A)** $Cr^{+}$ and $Mn^{2+}$ · Key from source paper

## Q145 JEE Main 2021 · 25 Feb · Shift 2 Numerical

Electromagnetic radiation of wavelength $663\ nm$ is just sufficient to ionise the atom of metal A. The ionization energy of metal A in $kJ\ mol^{-1}$ is _____. (Rounded-off to the nearest integer)

[h = $6.63 \times 10^{-34}$ Js, c = $3.00 \times 10^{8}\ ms^{-1}$, $N_A = 6.02 \times 10^{23}\ mol^{-1}$]

Numerical value type: the answer is a number.

**Answer: 181.** · Key from source paper

## Q146 JEE Main 2021 · 24 Feb · Shift 1 Numerical

A proton and a $Li^{3+}$ nucleus are accelerated by the same potential. If $\lambda_{Li}$ and $\lambda_p$ denote the de Broglie wavelengths of $Li^{3+}$ and proton respectively, then the value of $\frac{\lambda_{Li}}{\lambda_p}$ is $x \times 10^{-1}$. The value of x is _____ (Rounded off to the nearest integer) [Mass of $Li^{3+} = 8.3$ mass of proton]

Numerical value type: the answer is a number.

**Answer: 2.** · Key from source paper

## Q147 JEE Main 2021 · 24 Feb · Shift 2 MCQ

According to Bohr's atomic theory:
(A) Kinetic energy of electron is $\propto \frac{Z^2}{n^2}$.
(B) The product of velocity (v) of electron and principal quantum number (n), 'vn' $\propto Z^2$.
(C) Frequency of revolution of electron in an orbit is $\propto \frac{Z^3}{n^3}$.
(D) Coulombic force of attraction on the electron is $\propto \frac{Z^3}{n^4}$.
Choose the most appropriate answer from the options given below:

(A) (A), (C) and (D) only
(B) (A) and (D) only
(C) (C) only
(D) (A) only

**Answer: (B)** (A) and (D) only · Key from source paper

## Q148 JEE Main 2020 · 5 Sep · Shift 1 MCQ

The difference between the radii of $3^{rd}$ and $4^{th}$ orbits of $Li^{2+}$ is $\Delta R_1$. The difference between the radii of $3^{rd}$ and $4^{th}$ orbits of $He^+$ $\Delta R_2$. Ratio $\Delta R_1 : \Delta R_2$ is :

(A) 8 : 3
(B) 3 : 8
(C) 2 : 3
(D) 3 : 2

**Answer: (C)** 2 : 3 · Key from source paper

## Q149 JEE Main 2020 · 5 Sep · Shift 2 MCQ

The correct statement about probability density (except at infinite distance from nucleus) is :

(A) It can be zero for 1s orbital
(B) It can be negative for 2p orbital
(C) It can be zero for 3p orbital
(D) It can never be zero for 2s orbital

**Answer: (C) It can be zero for 3p orbital** · Key from source paper

---

**Q150** JEE Main 2020 · 4 Sep · Shift 1 MCQ

The region in the electromagnetic spectrum where the Balmer series lines appear is:

(A) Visible
(B) Microwave
(C) Infrared
(D) Ultraviolet

**Answer: (A) Visible** · Key from source paper

---

**Q151** JEE Main 2020 · 4 Sep · Shift 2 MCQ

The shortest wavelength of H atom in the Lyman series is $\lambda_1$. The longest wavelength in the Balmer series of $He^+$ is :

(A) $\frac{36\lambda_1}{5}$
(B) $\frac{5\lambda_1}{9}$
(C) $\frac{9\lambda_1}{5}$
(D) $\frac{27\lambda_1}{5}$

**Answer: (C)** $\frac{9\lambda_1}{5}$ · Key from source paper

---

**Q152** JEE Main 2020 · 3 Sep · Shift 2 MCQ

Consider the hypothetical situation where the azimuthal quantum number, $\ell$, takes values $0,\ 1,\ 2,\ \ldots\ldots\ldots n+1$. Where n is the principal quantum number. Then, the element with atomic number:

(A) 9 is the first alkali metal
(B) 13 has a half-filled valence subshell
(C) 8 is the first noble gas
(D) 6 has a 2p-valence subshell

**Answer: (B) 13 has a half-filled valence subshell** · Key from source paper

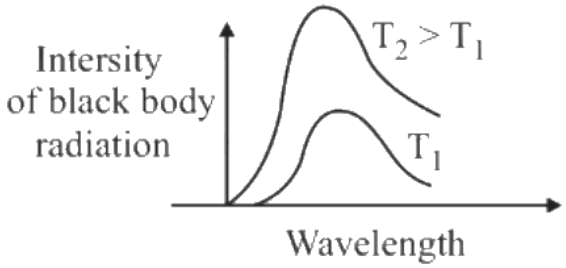
---

**Q153** JEE Main 2020 · 2 Sep · Shift 1 MCQ

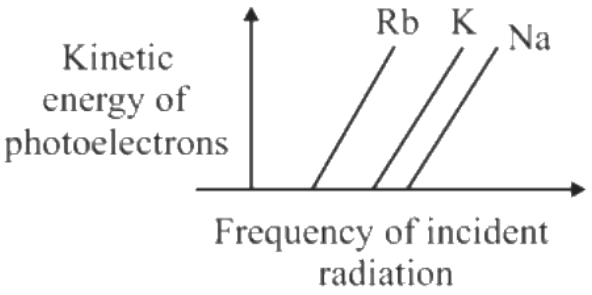
The figure that is not a direct manifestation of the quantum nature of atom is :
*(see the figure above)*

**Q26.** The figure that is not a direct manifestation of the quantum nature of atom is :

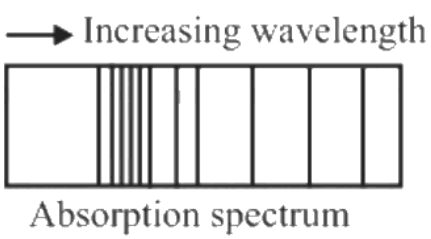
(1)



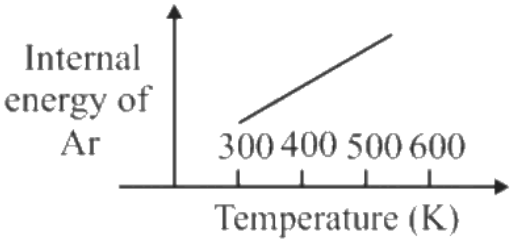

(2)




(3)




(4)




(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

**Answer: (D)** · Key from source paper

---

## Q154 JEE Main 2020 · 2 Sep · Shift 2 MCQ

The number of subshells associated with $n = 4$ and $m = -2$ quantum numbers is:

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

**Answer: (B)** 2 · Key from source paper

---

## Q155 JEE Main 2020 · 2 Sep · Shift 2 Numerical

The work function of sodium metal is $4.41 \times 10^{-19}$J. If photons of wavelength 300 nm are incident on the metal, the kinetics energy of the ejected electrons will be ($h = 6.63 \times 10^{-34}$ J s; $c = 3 \times 10^{8}$ m $s^{-1}$)
_____ $\times 10^{-21}$J

Numerical value type: the answer is a number.

**Answer: 222.** · Key from source paper

---

## Q156 JEE Main 2020 · 9 Jan · Shift 1 MCQ

The de Broglie wavelength of an electron in the $4^{th}$ Bohr orbit is:

(A) $2\pi a_0$

(B) $4\pi a_0$

(C) $6\pi a_0$

(D) $8\pi a_0$

**Answer: (D)** $8\pi a_0$ · Key from source paper

## Q157 JEE Main 2020 · 8 Jan · Shift 1 MCQ

For the Balmer series, in the spectrum of H atom, $\bar{\nu} = R_H \left\{ \frac{1}{n_1^2} - \frac{1}{n_2^2} \right\}$, the correct statements among (I) to (IV) are,

(I) As wavelength decreases, the lines in the series converge.

(II) The integer $n_1$ is equal to 2/

(III) The lines of the longest wavelength correspond to $n_2$ = 3.

(IV) The ionization energy of hydrogen can be calculated from the wave number of these lines.

(A) (I), (III), (IV)

(B) (I), (II), (III)

(C) (I), (II), (IV)

(D) (II), (III), (IV)

**Answer: (B)** (I), (II), (III) · Key from source paper

## Q158 JEE Main 2020 · 8 Jan · Shift 2 MCQ

The radius of the second Bohr orbit, in terms of the Bohr radius, $a_0$, in $Li^{2+}$ is:

(A) $\frac{2a_0}{3}$

(B) $\frac{4a_0}{9}$

(C) $\frac{4a_0}{3}$

(D) $\frac{2a_0}{9}$

**Answer: (C)** $\frac{4a_0}{3}$ · Key from source paper

## Q159 JEE Main 2020 · 7 Jan · Shift 1 MCQ

The number of orbitals associated with quantum numbers $n = 5, m_s = +\frac{1}{2}$ is:

(A) 11

(B) 25

(C) 50

(D) 15

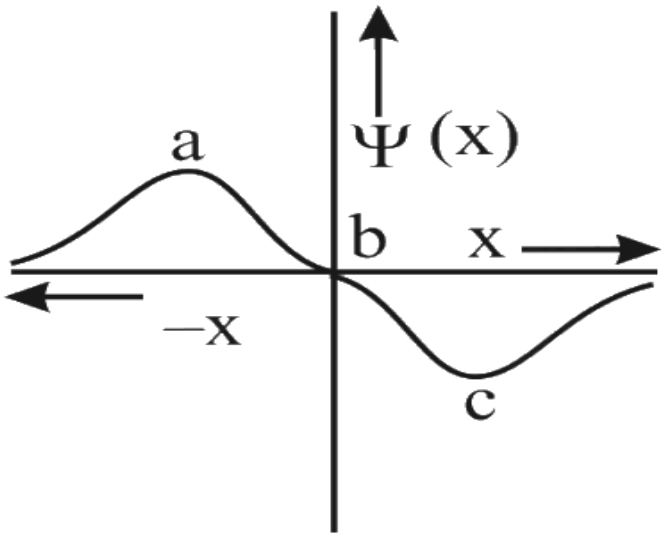
**Answer: (B)** 25 · Key from source paper

## Q160 JEE Main 2019 · 12 Apr · Shift 1 MCQ

The electrons are more likely to be found:

*(see the figure above)*

**Q32.** The electrons are more likely to be found:




(1) Only in the region a
(2) In the region a and b
(3) In the region a and c
(4) Only in the region c

(A) Only in the region a
(B) In the region a and b
(C) In the region a and c
(D) Only in the region c

**Answer: (C) In the region a and c** · Key from source paper

## Q161 JEE Main 2019 · 12 Apr · Shift 2 MCQ

Among the following, the energy of 2s orbital is lowest in:

(A) K
(B) H
(C) Na
(D) Li

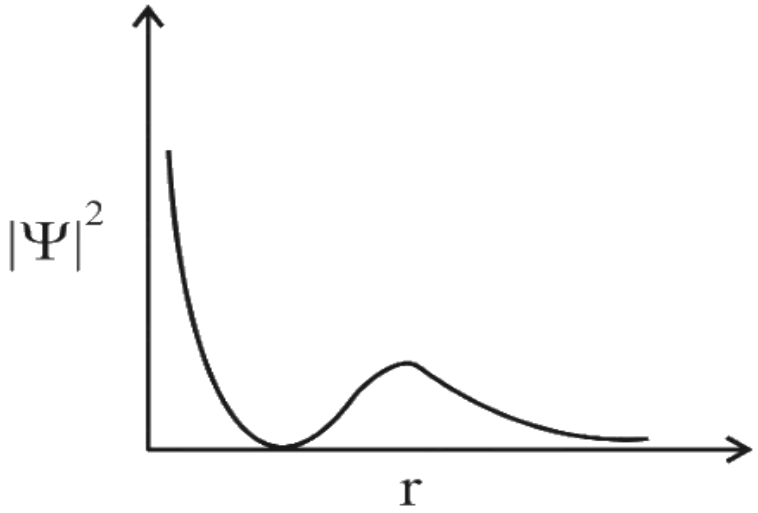
**Answer: (A) K** · Key from source paper

## Q162 JEE Main 2019 · 10 Apr · Shift 1 MCQ

The graph between $|\psi|^2$ and r (radical distance) is shown below. This represents:

*(see the figure above)*

**Q32.** The graph between $|\psi|^2$ and r (radical distance) is shown below. This represents:




(1) 3s orbital
(2) 2p orbital
(3) 2s orbital
(4) 1s orbital

(A) 3s orbital
(B) 2p orbital
(C) 2s orbital
(D) 1s orbital

**Answer: (C)** 2s orbital · Key from source paper

---

## Q163 JEE Main 2019 · 10 Apr · Shift 1 MCQ

The isoelectronic set of ions is:

(A) $F^-$, $Li^+$, $Na^+$ and $Mg^{2+}$
(B) $N^{3-}$, $Li^+$, $Mg^{2+}$ and $O^{2-}$
(C) $N^{3-}$, $O^{2-}$, $F^-$ and $Na^+$
(D) $Li^+$, $Na^+$, $O^{2-}$ and $F^-$

**Answer: (C)** $N^{3-}$, $O^{2-}$, $F^-$ and $Na^+$ · Key from source paper

---

## Q164 JEE Main 2019 · 10 Apr · Shift 2 MCQ

The ratio of the shortest wavelength of two spectral series of hydrogen spectrum is found to be about 9. The spectral series are:

(A) Paschen and Pfund
(B) Balmer and Brackett
(C) Lyman and Paschen
(D) Brackett and Pfund

**Answer: (C)** Lyman and Paschen · Key from source paper

**Q165** JEE Main 2019 · 9 Apr · Shift 1 MCQ

For any given series of spectral lines of atomic hydrogen, let $\Delta\bar{v} = \bar{v}_{\max} - \bar{v}_{\min}$ be the difference in maximum and minimum wave number in $\mathrm{cm}^{-1}$. The ratio $\Delta\bar{v}_{\mathrm{Lyman}}/\Delta\bar{v}_{\mathrm{Balmar}}$ is

(A) 5 : 4
(B) 27 : 5
(C) 4 : 1
(D) 9 : 4

**Answer: (D)** 9 : 4 · Key from source paper

**Q166** JEE Main 2019 · 9 Apr · Shift 2 MCQ

Which one of the following about an electron occupying the 1s orbital in a hydrogen atom is incorrect? (The Bohr radius is represented by $a_0$ ).

(A) The total energy of the electron is maximum when it is at a distance $a_0$ from the nucleus.
(B) The electron can be found at a distance $2a_0$ from the nucleus.
(C) The probability density of finding the electron is maximum at the nucleus.
(D) The magnitude of the potential energy is double that of its kinetic energy on an average.

**Options (2) or (1) were accepted. More than one answer was accepted.** · Key from source paper

**Q167** JEE Main 2019 · 8 Apr · Shift 1 MCQ

The quantum number of four electrons are given below:
I. n = 4, l = 2, $\mathrm{m_l}$ = - 2, $\mathrm{m_s}$ = - 1 / 2
II. n = 3, l = 2, $\mathrm{m_l}$ = 1, $\mathrm{m_s}$ = + 1 / 2
III. n = 4, l = 1, $\mathrm{m_l}$ = 0, $\mathrm{m_s}$ = + 1 / 2
IV. n = 3, l = 1, $\mathrm{m_l}$ = 1, $\mathrm{m_s}$ = - 1 / 2
The correct order of their increasing energies will be:

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

**Answer: (B)** IV < II < III < I · Key from source paper

**Q168** JEE Main 2019 · 8 Apr · Shift 2 MCQ

If p is the momentum of the fastest electron ejected from a metal surface after the irradiation of light having wavelength $\lambda$, then for 1.5 p momentum of the photoelectron, the wavelength of the light should be:
(Assume kinetic energy of ejected photoelectron to be very high in comparison to work function)

(A) $\frac{4}{9}\lambda$
(B) $\frac{3}{4}\lambda$
(C) $\frac{2}{3}\lambda$
(D) $\frac{1}{2}\lambda$

**Answer: (A)** $\frac{4}{9}\lambda$ · Key from source paper

---

## Q169 JEE Main 2019 · 12 Jan · Shift 1 MCQ

What is the work function of the metal if the light of wavelength 4000 $\text{Å}$ generates photoelectrons of velocity $6 \times 10^5\ \text{ms}^{-1}$ from it?
(Mass of electron = $9 \times 10^{-31}$ kg, velocity of light = $3 \times 10^8\ \text{ms}^{-1}$, Planck's constant = 6 .626 $\times 10^{-34}$ Js,
Charge of electron = 6 .626 $\times 10^{-34}$ Js)

(A) 0 .9 eV
(B) 4 .0 eV
(C) 3 .1 eV
(D) 2 .1 eV

**Answer: (D)** 2 .1 eV · Key from source paper

---

## Q170 JEE Main 2019 · 12 Jan · Shift 2 MCQ

If the de Broglie wavelength of the electron in $n^{th}$ Bohr orbit in a hydrogenic atom is equal to $1.5\pi a_0$ ( $a_0$ is Bohr radius), then the value of $\frac{n}{z}$ is:

(A) 1.50
(B) 1.0
(C) 0.4
(D) 0.75

**Answer: (D)** 0.75 · Key from source paper

---

## Q171 JEE Main 2019 · 11 Jan · Shift 1 MCQ

Heat treatment of muscular pain involves radiation of wavelength of about 900nm. Which spectral line of H atom is suitable for this purpose? [$R_H = 1 \times 10^5\ \text{cm}^{-1}$ · h = $6.6 \times 10^{-34}$Js, c = $3 \times 10^8\ \text{ms}^{-1}$]

(A) Paschen, $\infty \rightarrow 3$
(B) Paschen, $5 \rightarrow 3$
(C) Balmer, $\infty \rightarrow 2$
(D) Lyman, $\infty \rightarrow 1$

**Answer: (A)** Paschen, $\infty \rightarrow 3$ · Key from source paper

## Q172 JEE Main 2019 · 11 Jan · Shift 2 MCQ

The de Broglie wavelength $(\lambda)$ associated with a photoelectron varies with the frequency $(v)$ of the incident radiation as,[$v_0$ is threshold frequency]:

(A) $\lambda \propto \frac{1}{(v-v_0)}$

(B) $\lambda \propto \frac{1}{(v-v_0)^{\frac{1}{4}}}$

(C) $\lambda \propto \frac{1}{(v-v_0)^{\frac{3}{2}}}$

(D) $\lambda \propto \frac{1}{(v-v_0)^{\frac{1}{2}}}$

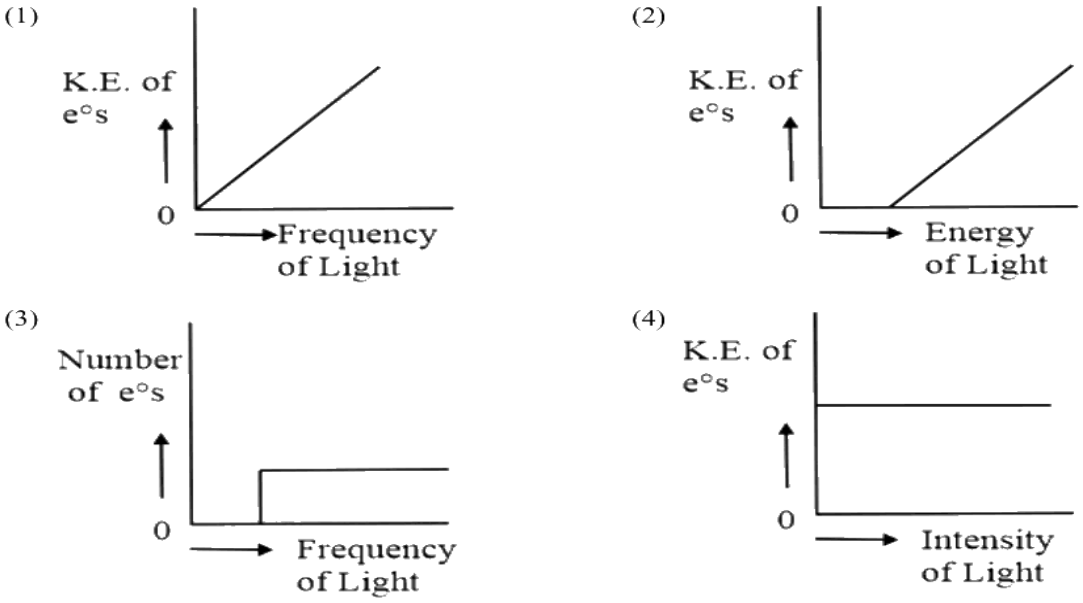
**Answer: (D)** $\lambda \propto \frac{1}{(v-v_0)^{\frac{1}{2}}}$ · Key from source paper

## Q173 JEE Main 2019 · 10 Jan · Shift 1 MCQ

Which of the graphs shown below does not represent the relationship between incident light and the electron ejected from metal surface?

*(see the figure above)*

**Q31.** Which of the graphs shown below does not represent the relationship between incident light and the electron ejected from metal surface?




(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

**Answer: (A)** · Key from source paper

## Q174 JEE Main 2019 · 10 Jan · Shift 2 MCQ

The $71^{st}$ electron of an element X with an atomic number of 71 enters the orbital:

(A) $5d$
(B) $4f$
(C) $6p$
(D) $6s$

**Answer: (A)** $5d$ · Key from source paper

**Q175** JEE Main 2019 · 10 Jan · Shift 2 MCQ

The ground state energy of a hydrogen atom is $-13.6\ \mathrm{eV}$. The energy of second excited state of $\mathrm{He}^{+}$ ion in $\mathrm{eV}$ is:

(A) $-27.2$
(B) $-6.04$
(C) $-3.4$
(D) $-54.4$

**Answer: (B)** $-6.04$ · Key from source paper

**Q176** JEE Main 2019 · 9 Jan · Shift 1 MCQ

For emission line of atomic hydrogen from $\mathrm{n_i} = 8$ to $\mathrm{n_f} = \mathrm{n}$, the plot of wave number $\tilde{\nu}$ against $\frac{1}{\mathrm{n}^2}$ will be: (The Rydberg constant, $\mathrm{R_H}$ is in wave number unit)

(A) Linear with slope $-\mathrm{R_H}$
(B) Non linear
(C) Linear with slope $\mathrm{R_H}$
(D) Linear with intercept $-\mathrm{R_H}$

**Answer: (C) Linear with slope** $\mathrm{R_H}$ · Key from source paper

**Q177** JEE Main 2019 · 9 Jan · Shift 2 MCQ

Which of the following combination of statements is true regarding the interpretation of the atomic orbitals?
$(A)$ An electron in an orbital of high angular momentum stays away from the nucleus than an electron in the orbital of lower angular momentum.
$(B)$ For a given value of the principal quantum number, the size of the orbit is inversely proportional to the azimuthal quantum number.
$(C)$ According to wave mechanics, the ground state angular momentum is equal to $\frac{h}{2\pi}$.
$(D)$ The plot of $\psi$ Vs $r$ for various azimuthal quantum numbers, shows peak shifting towards higher $r$ value.

(A) $(B), (C)$
(B) $(A), (B)$
(C) $(A), (C)$
(D) $(A), (D)$

**Answer: (D)** $(A), (D)$ · Key from source paper

---

**Q178** JEE Main 2018 · 16 Apr · Online MCQ

Which of the following statements is false?

(A) Splitting of spectral lines in electrical field is called Stark effect
(B) Frequency of emitted radiation from a black body goes from a higher wavelength to lower wavelength as the temperature increases
(C) Photon has momentum as well as wavelength
(D) Rydberg constant has unit of energy

**Answer: (D)** Rydberg constant has unit of energy · Key from source paper

---

**Q179** JEE Main 2018 · 15 Apr · Shift 1 MCQ

Ejection of the photoelectron from metal in the photoelectric effect experiment can be stopped by applying $0.5\ \mathrm{V}$ when the radiation of $250\ \mathrm{nm}$ is used. The work function of the metal is :

(A) $4\ \mathrm{eV}$
(B) $5.5\ \mathrm{eV}$
(C) $4.5\ \mathrm{eV}$
(D) $5\ \mathrm{eV}$

**Answer: (C)** $4.5\ \mathrm{eV}$ · Key from source paper

---

**Q180** JEE Main 2018 · 15 Apr · Shift 2 MCQ

The de-Broglie's wavelength of electron present in first Bohr orbit of ' H ' atom is:

(A) $4 \times 0.529\ \mathring{A}$
(B) $2\pi \times 0.529\ \mathring{A}$
(C) $\frac{0.529}{2\pi}\ \mathring{A}$
(D) $0.529\ \mathring{A}$

**Answer: (B)** $2\pi \times 0.529\ \mathring{A}$ · Key from source paper

---

**Q181** JEE Main 2017 · 9 Apr · Online MCQ

The electron in the hydrogen atom undergoes transition from higher orbitals to orbital of radius 211.6 pm. This transition is associated with

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

**Answer: (B) Balmer series** · Key from source paper

---

**Q182** JEE Main 2017 · 8 Apr · Online MCQ

If the shortest wavelength in Lyman series of hydrogen atom is A, then the longest wavelength in Paschen series of $\mathrm{He}^{+}$ is

(A) $\frac{5A}{9}$
(B) $\frac{36A}{7}$
(C) $\frac{36A}{5}$
(D) $\frac{9A}{5}$

**Answer: (B)** $\frac{36A}{7}$ · Key from source paper

---

**Q183** JEE Main 2017 · 2 Apr · Offline MCQ

Among the following species which option contains all isoelectronic species?

(A) $O^{-},\ F^{-},\ Na,\ Mg^{+}$
(B) $O^{2-},\ F^{-},\ Na,\ Mg^{2+}$
(C) $O^{-},\ F^{-},\ Na^{+},\ Mg^{2+}$
(D) $O^{2-},\ F^{-},\ Na^{+},\ Mg^{2+}$

**Answer: (D)** $O^{2-},\ F^{-},\ Na^{+},\ Mg^{2+}$ · Key from source paper

---

**Q184** JEE Main 2017 · 2 Apr · Offline MCQ

The radius of the second Bohr orbit for hydrogen atom is
(Planck's constant, $(\mathrm{h}) = 6.6262 \times 10^{-34}$ Js; mass of electron $= 9.1091 \times 10^{-31}$ kg; charge of electron $= 1.60210 \times 10^{-19}$ C; permittivity of vacuum, $(\epsilon_0) = 8.854185 \times 10^{-12}\ \mathrm{kg^{-1}\,m^{-3}A^{2}}$)

(A) $4.76$ Å
(B) $0.529$ Å
(C) $2.12$ Å
(D) $1.65$ Å

**Answer: (C)** $2.12$ Å · Key from source paper

---

**Q185** JEE Main 2016 · 10 Apr · Online MCQ

Aqueous solution of which of the following salts will not contain ions with the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6$ ?

(A) $NaF$
(B) $KBr$
(C) $NaCl$
(D) $CaI_2$

**Answer: (A)** $NaF$ · Key from source paper

---

**Q186** JEE Main 2016 · 9 Apr · Online MCQ

The total number of orbitals associated with the principal quantum number 5 is:

(A) 20
(B) 25
(C) 10
(D) 5

**Answer: (B)** 25 · Key from source paper

---

**Q187** JEE Main 2016 · 3 Apr · Offline MCQ

A stream of electrons from a heat filament was passed between two charge plates kept at a potential difference V esu. If e and m are charge and mass of an electron, respectively, then the value of $\frac{h}{\lambda}$ (where $\lambda$ is wavelength associated with the electron wave) is given by:

(A) $\sqrt{meV}$
(B) $\sqrt{2meV}$
(C) $meV$
(D) $2meV$

**Answer: (B)** $\sqrt{2meV}$ · Key from source paper

---

**Q188** JEE Main 2015 · 11 Apr · Online MCQ

At temperature T, the average kinetic energy of any particle is $\frac{3}{2}$kT. The de Broglie wavelength follows the order:

(A) Visible photon>thermal electron>thermal neutron.
(B) Thermal neutron>visible photon>thermal electron.
(C) Thermal neutron>thermal electron>visible photon.
(D) Visible photon>thermal neutron>thermal electron.

**Answer: (A) Visible photon>thermal electron>thermal neutron.** · Key from source paper

---

**Q189** JEE Main 2015 · 10 Apr · Online MCQ

If the principal quantum number n = 6, the correct sequence of filling of electrons will be:

(A) ns $\rightarrow$ (n $-$ 1) d $\rightarrow$ (n $-$ 2) f $\rightarrow$ np
(B) ns $\rightarrow$ np $\rightarrow$ (n $-$ 1)d $\rightarrow$ (n $-$ 2)f
(C) ns $\rightarrow$ (n $-$ 2)f $\rightarrow$ np $\rightarrow$ (n $-$ 1)d
(D) ns $\rightarrow$ (n $-$ 2)f $\rightarrow$ (n $-$ 1)d $\rightarrow$ np

**Answer: (D)** ns $\rightarrow$ (n $-$ 2)f $\rightarrow$ (n $-$ 1)d $\rightarrow$ np · Key from source paper

---

**Q190** JEE Main 2015 · 4 Apr · Offline MCQ

Which of the following is the energy of a possible excited state of hydrogen?

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

**Answer: (D)** $-3.4\ \text{eV}$ · Key from source paper

---

**Q191** JEE Main 2014 · 19 Apr · Online MCQ

The ionization energy of gaseous Na atoms is $495.5\ \text{kJ mol}^{-1}$. The lowest possible frequency of light that ionizes a sodium atom is $(\text{h} = 6.626 \times 10^{-34}\ \text{Js},\ \text{N}_\text{A} = 6.022 \times 10^{23}\ \text{mol}^{-1})$

(A) $1.24 \times 10^{15}\ \text{s}^{-1}$
(B) $7.50 \times 10^{4}\ \text{s}^{-1}$
(C) $4.76 \times 10^{14}\ \text{s}^{-1}$
(D) $3.15 \times 10^{15}\ \text{s}^{-1}$

**Answer: (A)** $1.24 \times 10^{15}\ \text{s}^{-1}$ · Key from source paper

---

**Q192** JEE Main 2014 · 12 Apr · Online MCQ

If $m$ and $e$ are the mass and charge of the revolving electron in the orbit of radius $r$ for hydrogen atom, the total energy of the revolving electron will be:

(A) $\frac{1}{2}\frac{e^2}{r}$
(B) $-\frac{e^2}{r}$
(C) $\frac{me^2}{r}$
(D) $-\frac{1}{2}\frac{e^2}{r}$

**Answer: (D)** $-\frac{1}{2}\frac{e^2}{r}$ · Key from source paper

---

**Q193** JEE Main 2014 · 12 Apr · Online MCQ

The de-Broglie wavelength of a particle of mass $6.63\ \text{g}$ moving with a velocity of $100\ \text{ms}^{-1}$ is:

(A) $10^{-33}\ \mathrm{m}$
(B) $10^{-35}\ \mathrm{m}$
(C) $10^{-31}\ \mathrm{m}$
(D) $10^{-25}\ \mathrm{m}$

**Answer: (A)** $10^{-33}\ \mathrm{m}$ · Key from source paper

---

**Q194** JEE Main 2014 · 12 Apr · Online MCQ

Excited hydrogen atom emits light in the ultraviolet region at $2.47 \times 10^{15}\ \mathrm{Hz}$. With this frequency, the energy of a single photon is: ($\mathrm{h} = 6.63 \times 10^{-34}\mathrm{Js}$)

(A) $8.041 \times 10^{-40}\ \mathrm{J}$
(B) $2.680 \times 10^{-19}\ \mathrm{J}$
(C) $1.640 \times 10^{-18}\ \mathrm{J}$
(D) $6.111 \times 10^{-17}\ \mathrm{J}$

**Answer: (C)** $1.640 \times 10^{-18}\ \mathrm{J}$ · Key from source paper

---

**Q195** JEE Main 2014 · 11 Apr · Online MCQ

If $\lambda_0$ and $\lambda$ be threshold wavelength and wavelength of incident light, the velocity of photoelectron ejected from the metal surface is:

(A) $\sqrt{\frac{2h}{m}(\lambda_0 - \lambda)}$
(B) $\sqrt{\frac{2hc}{m}(\lambda_\mathrm{o} - \lambda)}$
(C) $\sqrt{\frac{2hc}{m}\left(\frac{\lambda_0 - \lambda}{\lambda\lambda_0}\right)}$
(D) $\sqrt{\frac{2h}{m}\left(\frac{1}{\lambda_\mathrm{o}} - \frac{1}{\lambda}\right)}$

**Answer: (C)** $\sqrt{\frac{2hc}{m}\left(\frac{\lambda_0 - \lambda}{\lambda\lambda_0}\right)}$ · Key from source paper

---

**Q196** JEE Main 2014 · 11 Apr · Online MCQ

Based on the equation:

$$\Delta\mathrm{E} = -2.0 \times 10^{-18}\ \mathrm{J}\left(\frac{1}{\mathrm{n}_2^2} - \frac{1}{\mathrm{n}_1^2}\right)$$

the wavelength of the light that must be absorbed to excite hydrogen electron from level $n = 1$ to level $\mathrm{n} = 2$ will be: ($\mathrm{h} = 6.625 \times 10^{-34}\mathrm{Js}$, $\mathrm{C} = 3 \times 10^8\ \mathrm{ms}^{-1}$)

(A) $1.325 \times 10^{-7}\ \mathrm{m}$
(B) $1.325 \times 10^{-10}\ \mathrm{m}$
(C) $2.650 \times 10^{-7}\ \mathrm{m}$
(D) $5.300 \times 10^{-10}\ \mathrm{m}$

**Answer: (A)** $1.325 \times 10^{-7}\ \mathrm{m}$ · Key from source paper

---

**Q197** JEE Main 2014 · 9 Apr · Online MCQ

The energy of an electron in first Bohr's orbit of H atom is $-13.6\,\mathrm{eV}$. The energy value of electron in the first excited state of $\mathrm{Li}^{2+}$ is :

(A) $27.2\,\mathrm{eV}$
(B) $-30.6\,\mathrm{eV}$
(C) $30.6\,\mathrm{eV}$
(D) $-27.2\,\mathrm{eV}$

**Answer: (B)** $-30.6\,\mathrm{eV}$ · Key from source paper

---

**Q198** JEE Main 2014 · 6 Apr · Offline MCQ

The correct set of four quantum numbers for the valence electrons of rubidium atom (Z = 37) is

(A) 5, 0, 0, $+\frac{1}{2}$
(B) 5, 1, 0, $+\frac{1}{2}$
(C) 5, 1, 1, $+\frac{1}{2}$
(D) 5, 0, 1, $+\frac{1}{2}$

**Answer: (A)** 5, 0, 0, $+\frac{1}{2}$ · Key from source paper

---

**Q199** JEE Main 2013 · 25 Apr · Online MCQ

Given (A) n = 5, $\mathrm{m}_\ell$ = +1 (B) n = 2, $\ell$ = 1, $\mathrm{m}_\ell$ = $-1$, $\mathrm{m}_\mathrm{s}$ = $-1/2$ The maximum number of electron(s) in an atom that can have the quantum numbers as given in (A) and (B) are respectively:

(A) 25 and 1
(B) 8 and 1
(C) 2 and 4
(D) 4 and 1

**Answer: (B)** 8 and 1 · Key from source paper

---

**Q200** JEE Main 2013 · 23 Apr · Online MCQ

The de Broglie wavelength of a car of mass 1000 kg and velocity 36 km/hr is :

(A) $6.626 \times 10^{-34}$ m
(B) $6.626 \times 10^{-38}$ m
(C) $6.626 \times 10^{-31}$ m
(D) $6.626 \times 10^{-30}$ m

**Answer: (B)** $6.626 \times 10^{-38}$ m · Key from source paper

---

## Q201

JEE Main 2013 · 23 Apr · Online · MCQ

The numbers of protons, electrons and neutrons in a molecule of heavy water are respectively :

(A) 8, 10, 11
(B) 10, 10, 10
(C) 10, 11, 10
(D) 11, 10, 10

**Answer: (B)** 10, 10, 10 · Key from source paper

---

## Q202

JEE Main 2013 · 22 Apr · Online · MCQ

The wave number of the first emission line in the Balmer series of H-Spectrum is : (R = Rydberg constant ) :

(A) $\frac{5}{36}R$
(B) $\frac{9}{400}R$
(C) $\frac{7}{6}R$
(D) $\frac{3}{4}R$

**Answer: (A)** $\frac{5}{36}R$ · Key from source paper

---

## Q203

JEE Main 2013 · 9 Apr · Online · MCQ

In an atom how many orbital(s) will have the quantum numbers; $n = 3, l = 2$ and $m_l = +2$ ?

(A) 5
(B) 3
(C) 1
(D) 7

**Answer: (C)** 1 · Key from source paper

---

## Q204

JEE Main 2013 · 7 Apr · Offline · MCQ

Energy of an electron is given by $\mathrm{E} = -2.178 \times 10^{-18}\left(\frac{Z^2}{n^2}\right)$ J. Wavelength of light required to excite an electron in a hydrogen atom from level n=1 to n=2 will be :
(h = $6.62 \times 10^{-34}$ Js and c = $3.0 \times 10^{8}\ \mathrm{ms}^{-1}$)

(A) $6.500 \times 10^{-7}$ m
(B) $8.500 \times 10^{-7}$ m
(C) $1.214 \times 10^{-7}$ m
(D) $2.816 \times 10^{-7}$ m

**Answer: (C)** $1.214 \times 10^{-7}$ m · Key from source paper

### Q205 AIEEE 2012 · 26 May · Online MCQ

The following sets of quantum numbers represent four electrons in an atom. (i) $n = 4, l = 1$ (ii) $n = 4, l = 0$ (iii) $n = 3, l = 2$ (iv) $n = 3, l = 1$ The sequence representing increasing order of energy, is

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

**Answer: (B)** (iv) < (ii) < (iii) < (i) · Key from source paper

### Q206 AIEEE 2012 · 26 May · Online MCQ

The number of unpaired electrons in Gadolinium [Z = 64] is

(A) 3
(B) 8
(C) 6
(D) 2

**Answer: (B)** 8 · Key from source paper

### Q207 AIEEE 2012 · 19 May · Online MCQ

If the kinetic energy of an electron is increased four times, the wavelength of the de-Broglie wave associated with it would become

(A) one fourth
(B) half
(C) four times
(D) two times

**Answer: (B)** half · Key from source paper

### Q208 AIEEE 2012 · 12 May · Online MCQ

If the radius of first orbit of H atom is $a_0$, the deBroglie wavelength of an electron in the third orbit is

(A) $4\pi a_0$
(B) $8\pi a_0$
(C) $6\pi a_0$
(D) $2\pi a_0$

**Answer: (C)** $6\pi a_0$ · Key from source paper

## Q209 AIEEE 2012 · 7 May · Online MCQ

The limiting line in Balmer series will have a frequency of (Rydberg constant, $R_\infty = 3.29 \times 10^{15}$ cycles /s )

(A) $8.22 \times 10^{14}\ \mathrm{s}^{-1}$
(B) $3.29 \times 10^{15}\ \mathrm{s}^{-1}$
(C) $3.65 \times 10^{14}\ \mathrm{s}^{-1}$
(D) $5.26 \times 10^{13}\ \mathrm{s}^{-1}$

**Answer: (A)** $8.22 \times 10^{14}\ \mathrm{s}^{-1}$ · Key from source paper

## Q210 AIEEE 2012 · Offline MCQ

The electrons identified by quantum numbers n and $l$ : (a) $n = 4, l = 1$ (b) $n = 4, l = 0$ (c) $n = 3, l = 2$ (d) $n = 3, l = 1$ Can be placed in order of increasing energy as:

(A) (c) < (d) < (b) < (a)
(B) (d) < (b) < (c) < (a)
(C) (b) < (d) < (a) < (c)
(D) (a) < (c)< (b) < (d)

**Answer: (B)** (d) < (b) < (c) < (a) · Key from source paper

## Q211 AIEEE 2011 MCQ

A gas absorbs a photon of 355 nm and emits at two wavelengths. If one of the emissions is at 680 nm, the other is at:

(A) 325 nm
(B) 743 nm
(C) 518 nm
(D) 1035 nm

**Answer: (B)** 743 nm · Key from source paper

## Q212 AIEEE 2010 MCQ

Ionisation energy of $\mathrm{He}^+$ is $19.6 \times 10^{-18}\ \mathrm{J\,atom}^{-1}$. The energy of the first stationary state (n = 1) of $\mathrm{Li}^{2+}$ is

(A) $4.41 \times 10^{-16}\ \text{J atom}^{-1}$
(B) $-4.41 \times 10^{-17}\ \text{J atom}^{-1}$
(C) $-2.2 \times 10^{-15}\ \text{J atom}^{-1}$
(D) $8.82 \times 10^{-17}\ \text{J atom}^{-1}$

**Answer: (B)** $-4.41 \times 10^{-17}\ \text{J atom}^{-1}$ · Key from source paper

## Q213 AIEEE 2010 MCQ

The energy required to break one mole of $\text{Cl} - \text{Cl}$ bonds in $\text{Cl}_2$ is $242\ \text{kJ mol}^{-1}$. The longest wavelength of light capable of breaking a single $\text{Cl} - \text{Cl}$ bond is ($c = 3 \times 10^8\ \text{ms}^{-1}$ and $N_A = 6.02 \times 10^{23}\ \text{mol}^{-1}$)

(A) 594 nm
(B) 640 nm
(C) 700 nm
(D) 494 nm

**Answer: (D)** 494 nm · Key from source paper

## Q214 AIEEE 2009 MCQ

In an atom, an electron is moving with a speed of 600 m/s with an accuracy of 0.005%. Certainty with which the position of the electron can be located is ($h = 6.6 \times 10^{-34}\ \text{kg m}^2\ \text{s}^{-1}$, mass of electron, $e_m = 9.1 \times 10^{-31}$ kg )

(A) $1.52 \times 10^{-4}$ m
(B) $5.10 \times 10^{-3}$ m
(C) $1.92 \times 10^{-3}$ m
(D) $3.84 \times 10^{-3}$ m

**Answer: (C)** $1.92 \times 10^{-3}$ m · Key from source paper

## Q215 AIEEE 2009 MCQ

Calculate the wavelength (in nanometer) associated with a proton moving at $1.0 \times 10^3\ \text{ms}^{-1}$ (Mass of proton = $1.67 \times 10^{-27}$ kg and h = $6.63 \times 10^{-34}$ Js ):

(A) 0.032 nm
(B) 0.40 nm
(C) 2.5 nm
(D) 14.0 nm

**Answer: (B)** 0.40 nm · Key from source paper

## Q216 AIEEE 2008 MCQ

Which one of the following constitutes a group of the isoelectronic species?

(A) $C_2^{2-}, O_2^-, CO, NO$
(B) $NO^+, C_2^{2-}, CN^-, N_2$
(C) $CN^-, N_2, O_2^{2-}, C_2^{2-}$
(D) $N_2, O_2^-, NO^+, CO$

**Answer: (B)** $NO^+, C_2^{2-}, CN^-, N_2$ · Key from source paper

## Q217 AIEEE 2008 MCQ

The ionization enthalpy of hydrogen atom is $1.312 \times 10^6\ \text{J mol}^{-1}$. The energy required to excite the electron in the atom from $n = 1$ to $n = 2$ is

(A) $8.51 \times 10^5\ \text{J mol}^{-1}$
(B) $6.56 \times 10^5\ \text{J mol}^{-1}$
(C) $7.56 \times 10^5\ \text{J mol}^{-1}$
(D) $9.84 \times 10^5\ \text{J mol}^{-1}$

**Answer: (D)** $9.84 \times 10^5\ \text{J mol}^{-1}$ · Key from source paper

## Q218 AIEEE 2007 MCQ

Which of the following sets of quantum numbers represents the highest energy of an atom?

(A) n = 3, l = 1, m = 1, s = +1/2
(B) n = 3, l = 2, m = 1, s = +1/2
(C) n = 4, l = 0, m = 0, s = +1/2
(D) n = 3, l = 0, m = 0, s = +1/2

**Answer: (B)** n = 3, l = 2, m = 1, s = +1/2 · Key from source paper

## Q219 AIEEE 2007 MCQ

Which of the following nuclear reactions will generate an isotope?

(A) neutron particle emission
(B) positron emission
(C) $\alpha$-particle emission
(D) $\beta$-particle emission

**Answer: (A) neutron particle emission** · Key from source paper

## Q220 AIEEE 2006 MCQ

According to Bohr's theory, the angular momentum of an electron in $5^{\text{th}}$ orbit is

(A) $25\frac{h}{\pi}$
(B) $1.0\frac{h}{\pi}$
(C) $10\frac{h}{\pi}$
(D) $2.5\frac{h}{\pi}$

**Answer: (D)** $2.5\frac{h}{\pi}$ · Key from source paper

## Q221 AIEEE 2006 MCQ

In the transformation of $^{238}_{92}\mathrm{U}$ to $^{234}_{92}\mathrm{U}$, if one emission is an $\alpha$-particle, what should be the other emission(s)?

(A) Two $\beta^-$
(B) Two $\beta^-$ and one $\beta^+$
(C) One $\beta^-$ and one $\gamma$
(D) One $\beta^+$ and one $\beta^-$

**Answer: (A)** Two $\beta^-$ · Key from source paper

## Q222 AIEEE 2006 MCQ

Uncertainty in the position of an electron (mass = $9.1 \times 10^{-31}$ kg ) moving with a velocity 300 $\mathrm{ms}^{-1}$, accurate upto 0.001%, will be

(A) $19.2 \times 10^{-2}$ m
(B) $5.76 \times 10^{-2}$ m
(C) $1.92 \times 10^{-2}$ m
(D) $3.84 \times 10^{-2}$ m (h = $6.63 \times 10^{-34}$ Js)

**Answer: (C)** $1.92 \times 10^{-2}$ m · Key from source paper

## Q223 AIEEE 2006 MCQ

Which one of the following sets of ions represents a collection of isoelectronic species?

(A) $\mathrm{K}^+, \mathrm{Cl}^-, \mathrm{Ca}^{2+}, \mathrm{Sc}^{3+}$
(B) $\mathrm{Ba}^{2+}, \mathrm{Sr}^{2+}, \mathrm{K}^+, \mathrm{S}^{2-}$
(C) $\mathrm{N}^{3-}, \mathrm{O}^{2-}, \mathrm{F}^-, \mathrm{S}^{2-}$
(D) $\mathrm{Li}^+, \mathrm{Na}^+, \mathrm{Mg}^{2+}, \mathrm{Ca}^{2+}$

**Answer: (A)** $\mathrm{K}^+, \mathrm{Cl}^-, \mathrm{Ca}^{2+}, \mathrm{Sc}^{3+}$ · Key from source paper

## Q224 AIEEE 2005 MCQ

In a multi - electron atom, which of the following orbitals described by the three quantum numbers will have the same energy in the absence of magnetic acid (sic) and electric fields? (a) $n = 1, l = 0, m = 0$ (b) $n = 2, l = 0, m = 0$ (c) $n = 2, l = 1, m = 1$ (d) $n = 3, l = 2, m = 1$ (e) $n = 3, l = 2, m = 0$

(A) (a) and (b)
(B) (b) and (c)
(C) (c) and (d)
(D) (d) and (e)

**Answer: (D)** (d) and (e) · Key from source paper

## Q225 AIEEE 2005 MCQ

Of the following sets which one does NOT contain isoelectronic species?

(A) $PO_4^{-3}, SO_4^{-2}, ClO_4^-$
(B) $CN^-, N_2, C_2^{2-}$
(C) $SO_3^{-2}, CO_3^{-2}, NO_3^-$
(D) $BO_3^{-3}, CO_3^{-2}, NO_3^-$

**Answer: (C)** $SO_3^{-2}, CO_3^{-2}, NO_3^-$ · Key from source paper

## Q226 AIEEE 2005 MCQ

Which of the following statements in relation to the hydrogen atom is correct?

(A) 3s orbital is lower in energy than 3p orbital
(B) 3p orbital is lower in energy than 3d orbital
(C) 3s and 3p orbitals are of lower energy than 3d orbital
(D) 3s, 3p and 3d orbitals all have the same energy

**Answer: (D)** 3s, 3p and 3d orbitals all have the same energy · Key from source paper

## Q227 AIEEE 2005 MCQ

The photon of hard gamma radiation knocks a proton out of $^{24}_{12}Mg$ nucleus to form

(A) the isotope of parent nucleus
(B) the isobar of parent nucleus
(C) the nuclide $^{23}_{11}Na$
(D) the isobar of $^{23}_{11}Na$

**Answer: (C)** the nuclide $^{23}_{11}Na$ · Key from source paper

## Q228 AIEEE 2005 MCQ

Hydrogen bomb is based on the principle of

(A) Nuclear fission
(B) Natural radioactivity
(C) Nuclear fusion
(D) Artificial radioactivity

**Answer: (C) Nuclear fusion** · Key from source paper

## Q229 AIEEE 2004 MCQ

Which of the following sets of quantum numbers is correct for an electron in 4f orbital?

(A) $n = 4, l = 3, \mathrm{m} = +4, \mathrm{s} = +\frac{1}{2}$
(B) $n = 3, l = 2, m = -2, S = +\frac{1}{2}$
(C) $n = 4, l = 3, m = +1, s = +\frac{1}{2}$
(D) $n = 4, l = 4, m - 4, s = -\frac{1}{2}$

**Answer: (C)** $n = 4, l = 3, m = +1, s = +\frac{1}{2}$ · Key from source paper

## Q230 AIEEE 2004 MCQ

Consider the ground state of Cr atom ($Z = 24$). The number of electrons with the azimuthal quantum numbers $l = 1$ and 2 are respectively

(A) 12 and 4
(B) 16 and 5
(C) 16 and 4
(D) 12 and 5

**Answer: (D)** 12 and 5 · Key from source paper

## Q231 AIEEE 2004 MCQ

The wavelength of the radiation emitted, when in hydrogen atom electron falls from infinity to stationary state 1, would be (Rydberg constant $= 1.097 \times 10^{7}\ \mathrm{m}^{-1}$)

(A) $91\ \mathrm{nm}$
(B) $9.1 \times 10^{-8}\ \mathrm{nm}$
(C) $406\ \mathrm{nm}$
(D) $192\ \mathrm{nm}$

**Answer: (A)** $91\ \mathrm{nm}$ · Key from source paper

## Q232 AIEEE 2004 MCQ

Which one the following sets of ions represents the collection of isoelectronic species?

(A) $K^+, Ca^{2+}, Sc^{3+}, Cl^-$
(B) $Na^+, Mg^{2+}, Al^{3+}, Cl^-$
(C) $K^+, Cl^-, Mg^{2+}, Sc^{3+}$
(D) $Na^+, Ca^{2+}, Sc^{3+}, F^-$

**Answer: (A)** $K^+, Ca^{2+}, Sc^{3+}, Cl^-$ · Key from source paper

## Q233 AIEEE 2004 MCQ

Consider the following nuclear reactions

$^{238}_{92}M \rightarrow {}^{x}_{y}N + {}^{4}_{2}He$

$^{N}_{y}N \rightarrow {}^{A}_{B}L + 2\beta^+$

The number of neutrons in the element $L$ is

(A) 142
(B) 146
(C) 140
(D) 144

**Answer: (B) 146** · Checked by our team

## Q234 AIEEE 2003 MCQ

The orbital angular momentum for an electron revolving in an orbit is given by $\sqrt{l(l+1)} \cdot \frac{h}{2\pi}$. This momentum for an s-electron will be given by

(A) zero
(B) $\frac{h}{2\pi}$
(C) $\sqrt{2} \cdot \frac{h}{2\pi}$
(D) $+\frac{1}{2} \cdot \frac{h}{2\pi}$

**Answer: (A) zero** · Key from source paper

## Q235 AIEEE 2003 MCQ

Which one of the following groupings represents a collection of isoelectronic species? (At. nos,: 55, Br:35)

(A) $N^{3-}, F^-, Na^+$
(B) $Be, Al^{3+}, Cl^-$
(C) $Ca^{2+}, Cs^+, Br$
(D) $Na^+, Ca^{2+}, Mg^{2+}$

**Answer: (A)** $N^{3-}, F^-, Na^+$ · Key from source paper

**Q236** AIEEE 2003 MCQ

In Bohr series of lines of hydrogen spectrum, the third line from the red end corresponds to which one of the following inter-orbit jumps of the electron for Bohr orbits in an atom of hydrogen

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

**Answer: (A)** $5 \rightarrow 2$ · Key from source paper

**Q237** AIEEE 2003 MCQ

The de Broglie wavelength of a tennis ball of mass 60 g moving with a velocity of 10 metres per second is approximately. Planck's constant, h = 6.63 × $10^{-34}$ Js.

(A) $10^{-31}$ metres
(B) $10^{-16}$ metres
(C) $10^{-25}$ metres
(D) $10^{-33}$ metres

**Answer: (D)** $10^{-33}$ **metres** · Key from source paper

**Q238** AIEEE 2003 MCQ

The radionucleide $^{234}_{90}\mathrm{Th}$ undergoes two successive $\beta$-decays followed by one $\alpha$-decay. The atomic number and the mass number respectively of the resulting radionucleide are

(A) 94 and 230
(B) 90 and 230
(C) 92 and 230
(D) 92 and 234

**Answer: (B)** 90 and 230 · Key from source paper

**Q239** AIEEE 2003 MCQ

The number of d-electrons retained in $\mathrm{Fe}^{2+}$ (At.no.of Fe = 26 ) ion is

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

**Answer: (C)** 6 · Key from source paper

**Q240** AIEEE 2002 MCQ

In a hydrogen atom, if energy of an electron in ground state is 13.6 eV, then that in the 2nd excited state is

(A) 1.51 eV
(B) 3.4 eV
(C) 6.04 eV
(D) 13.6 eV

**Answer: (A)** 1.51 eV · Key from source paper

**Q241** AIEEE 2002 MCQ

Uncertainty in position of a minute particle of mass 25 g in space is $10^{-5}$ m. What is the uncertainty in its velocity (in $\mathrm{ms}^{-1}$)? ( h = $6.6 \times 10^{-34}$ Js)

(A) $2.1 \times 10^{-34}$
(B) $0.5 \times 10^{-34}$
(C) $2.1 \times 10^{-28}$
(D) $0.5 \times 10^{-23}$

**Answer: (C)** $2.1 \times 10^{-28}$ · Key from source paper

**Q242** AIEEE 2002 MCQ

$\beta$ - particle is emitted in radioactivity by

(A) conversion of proton to neutron
(B) from outermost orbit
(C) conversion of neutron to proton
(D) $\beta$-particle is not emitted

**Answer: (C) conversion of neutron to proton** · Key from source paper

EdLoop JEE