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JEE MAIN ATOMS — BOHR MODEL OF THE HYDROGEN ATOM (RADIUS, VELOCITY, ENERGY) — PYQS

Max. Marks: 44 **Questions:** 11

Section A (MCQ) — 10 questions

Q.1 Angular momentum of an electron in a hydrogen atom is $\frac{3h}{\pi}$, then the energy of the electron is _____ eV.

[JEE Main 2026 (Online) 2nd April Morning Shift]

(1) −1.51 (2) −0.85 (3) −0.38 (4) −0.28

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Q.2 Two electrons are moving in orbits of two hydrogen-like atoms with speeds 3×10^5 m/s and 2.5×10^5 m/s respectively. If the radii of these orbits are nearly same then the possible order of energy states are _____ respectively.

[JEE Main 2026 (Online) 24th January Morning Shift]

(1) 8 and 10 (2) 10 and 12

(3) 9 and 8 (4) 6 and 5

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Q.3 The energy of an electron in an orbit of the Bohr's atom is $-0.04E_0$ eV where E_0 is the ground state energy. If L is the angular momentum of the electron in this orbit and h is the Planck's constant, then $\frac{2\pi L}{h}$ is _____ :

[JEE Main 2026 (Online) 21st January Evening Shift]

(1) 6 (2) 2 (3) 5 (4) 4

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Q.4 In a hydrogen like ion, the energy difference between the 2nd excitation energy state and ground is 108.8 eV. The atomic number of the ion is:

[JEE Main 2025 (Online) 7th April Morning Shift]

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

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Q.5 Considering the Bohr model of hydrogen-like atoms, the ratio of the radius of 5th orbit of the electron in Li^{2+} and He^+ is

[JEE Main 2025 (Online) 4th April Morning Shift]

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

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Q.6 Given below are two statements :

Statement-I: The dimensions of Planck's constant and angular momentum are the same.

Statement-II: In Bohr's model electrons revolve around the nucleus only in those orbits for which angular momentum is integral multiple of Planck's constant.

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

[JEE Main 2025 (Online) 4th April Evening Shift]

(1) Both Statement-I and Statement-II are correct

(2) Statement-I is correct but Statement-II is incorrect

(3) Both Statement-I and Statement-II are incorrect

(4) Statement-I is incorrect but Statement-II is correct

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Q.7 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**.

Assertion (A): The Bohr model is applicable to hydrogen and hydrogen-like atoms only.

Reason (R): The formulation of Bohr model does not include repulsive force between electrons.

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

[JEE Main 2025 (Online) 3rd April Evening Shift]

(1) A is true but R is false

(2) Both A and R are true and R is the correct explanation of A

(3) A is false but R is true

(4) Both A and R are true but R is NOT the correct explanation of A

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Q.8 Considering Bohr's atomic model for hydrogen atom :

A. the energy of H atom in ground state is same as energy of He^+ ion in its first excited state.

B. the energy of H atom in ground state is same as that for Li^{++} ion in its second excited state.

C. the energy of H atom in its ground state is same as that of He^+ ion for its ground state.

D. the energy of He^+ ion in its first excited state is same as that for Li^{++} ion in its ground state.

Choose the correct answer from the options given below : [JEE Main 2025 (Online) 2nd April Morning Shift]

(1) (A), (B) only (2) (A), (D) only

(3) (A), (C) only (4) (B), (D) only

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Q.9 Assuming the validity of Bohr's atomic model for hydrogen-like ions the radius of Li^{++} ion in its ground state is given by $\frac{1}{X}a_0$, where X = _____ (Where a_0 is the first Bohr's radius.)

[JEE Main 2025 (Online) 2nd April Evening Shift]

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

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Q.10 The frequency of revolution of the electron in Bohr's orbit varies with n, the principal quantum number as:

[JEE Main 2025 (Online) 28th January Evening Shift]

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

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Section B (Numerical) — 1 question

Q.11 Using Bohr's model, calculate the ratio of the magnetic fields generated due to the motion of the electrons in the 2nd and 4th orbits of hydrogen atom _____. [JEE Main 2026 (Online) 2nd April Evening Shift]

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ANSWER KEY

Section A (MCQ) — 10 questions

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

Section B (Numerical) — 1 question

Ques.	11										
Ans.	32										