CHAPTER 12

OPEN STUDENT FOUNDATION
Physics (Class 12)
PRACTICE SHEET DAY 12

Date : 27/02/24

Section A

● **Write the answer of the following questions. [Each carries 1 Mark]** **[10]**

1. Write two postulates of Bohr's theory.
2. If is found experimentally that 13.6 eV energy is required to separate a hydrogen atom into a proton and an electron. Compute the orbital radius and the velocity of the electron in a hydrogen atom.
3. State Bohr's postulates for atomic model. Derive the equations for orbital radius, orbital speed and total energy for an electron in n^{th} orbit in hydrogen atom.
4. Using the formula for the radius of n^{th} orbit $r_n = \frac{n^2h^2\varepsilon_0}{\pi mZe^2}$ derive an expression for the total energy of electron in n^{th} Bohr's orbit.
5. The radius of the innermost electron orbit of a hydrogen atom is 5.3×10^{-11} m. What are the radii of the $n = 2$ and $n = 3$ orbits ?
6. (a) Using the Bohr's model calculate the speed of the electron in a hydrogen atom in the $n = 1$, 2, and 3 levels.
   (b) Calculate the orbital period in each of these levels.
7. In the Rutherford's nuclear model of the atom, the nucleus (radius about 10^{-15} m) is analogous to the sun about which the electron move in orbit (radius $\approx 10^{-10}$ m) like the earth orbits around the sun. If the dimensions of the solar system had the same proportions as those of the atom, would the earth be closer to or farther away from the sun than actually it is ? The radius of earth's orbit is about 1.5×10^{11} m. The radius of sun is taken as 7×10^8 m.
8. In accordance with the Bohr's model, find the quantum number that characterises the earth's revolution around the sun in an orbit of radius 1.5×10^{11} m with orbital speed 3×10^4 m/s. (Mass of earth = 6.0×10^{24} kg.)
9. Explain the formulas of energy of electron in atom revolving around the nucleus in different orbits.
10. The ground state energy of hydrogen atom is – 13.6 eV. What are the kinetic and potential energies of the electron in this state ?

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Section [A] : 1 Marks Questions					
No	Ans	Chap	Sec	Que	Universal_QueId
1.	-	Chap 12	S8	1	QP23P11B1211_P2C12S8Q1
2.	-	Chap 12	S8	3	QP23P11B1211_P2C12S8Q3
3.	-	Chap 12	S8	5.1	QP23P11B1211_P2C12S8Q5.1
4.	-	Chap 12	S9	19	QP23P11B1211_P2C12S9Q19
5.	-	Chap 12	S9	18	QP23P11B1211_P2C12S9Q18
6.	-	Chap 12	S10	20	QP23P11B1211_P2C12S10Q20
7.	-	Chap 12	S10	19	QP23P11B1211_P2C12S10Q19
8.	-	Chap 12	S10	18	QP23P11B1211_P2C12S10Q18
9.	-	Chap 12	S10	17	QP23P11B1211_P2C12S10Q17
10.	-	Chap 12	S10	16	QP23P11B1211_P2C12S10Q16

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➠ $r = 5.3 \times 10^{11}$ m, U = 2.2×10^6 m/s

3. State Bohr's postulates for atomic model. Derive the equations for orbital radius, orbital speed and total energy for an electron in n^{th} orbit in hydrogen atom.

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