Level - 1

MCQ Type Question:

1. The momentum of an electron revolving in n^{th} orbit is given by

   Ⓐ $\dfrac{nh}{2\pi r}$ Ⓑ $\dfrac{nh}{2r}$ Ⓒ $\dfrac{nh}{2\pi}$ Ⓓ $\dfrac{2\pi r}{nh}$

   [Hints : According to Bohr's model angular momentum = $mvr = n\dfrac{h}{2\pi}$]

2. The radius of the nth orbit in Bohr model of hydrogen atom is proportional to

   Ⓐ $\dfrac{1}{n^2}$ Ⓑ $\dfrac{1}{n}$ Ⓒ n^2 Ⓓ n

3. If an electron is moving in the nth orbit of the hydrogen atom, then its velocity for the nth orbit is proportional to

   Ⓐ $\dfrac{1}{n}$ Ⓑ n Ⓒ $\dfrac{1}{n^2}$ Ⓓ n^2

4. An electron makes a transition from $n = 2$ level to $n = 1$ level in the Bohr model of a hydrogen atom. Its period of revolution

   Ⓐ increases by 87.5%   Ⓑ decreases by 87.5%   Ⓒ increases 43.75%   Ⓓ decreases by 43.75%

5. The radius of third stationary orbit of electron for Bohr atom is R. The radius of fourth stationary orbit will be

   Ⓐ $\dfrac{4R}{3}$ Ⓑ $\dfrac{16R}{9}$ Ⓒ $\dfrac{3R}{4}$ Ⓓ $\dfrac{9R}{16}$

   [Hints : Radius $\propto n^2$]

6. An electron makes a transition from orbit $n = 2$ to orbit $n = 1$ in Bohr's model of hydrogen atom. Consider change in magnitude of its kinetic energy (K) and potential energy (U)

   Ⓐ K increases and U decreases   Ⓑ K decreases and U increases

   Ⓒ Both K and U decreases   Ⓓ Both K and U increases

   [Hints : $K = \dfrac{13.6}{n^2}$ eV and $U = \dfrac{27.2}{n^2}$ eV]

Short answer type questions (SA)

7. a) State three postulates of Bohr's theory of hydrogen atom.

   b) Find the angular momentum of an electron revolving in the second orbit in Bohr's hydrogen atom.

8. Draw the graph for hydrogen atom of the following

   (i) radius of orbit (r_n) as a function of orbit number (n).

   (ii) Velocity of electrons (v_n) as a function of orbit number (n).

9. Find the ratio of longest wavelength in Lyman series to the shortest wavelength in Balmer series.

10. a) Using Bohr's postulates, obtain the expression for total energy of the electron in the nth orbit of hydrogen atom.

    b) What is the significance of negative sign in the expression for the energy.

11. Draw a labeled diagram for α particle scattering experiment. Give Rutherford's observations and discuss the significance of this experiment. [2]

ANSWER

1. Ⓒ	9. Ⓐ	17. 2.6 m^2
2. Ⓒ	10. Ⓐ	18. b) 20 cm towards mark from the surface opposite to mark
3. Ⓑ	11. Ⓒ	
4. Ⓒ	12. Ⓐ	19.
5. Ⓑ	13.	20.
6. Ⓐ	14.	21.
7. Ⓐ	15. 30°	
8. Ⓒ	16.	