DPP
DAILY PRACTICE PROBLEMS

CLASS : XIITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 4**

Topic :-Atoms

1. According to Bohr's theory of hydrogen atom, for the electron in the nth allowed orbit the
   (i) Linear momentum is proportional to $1/n$
   (ii)Radius is proportional to n
   (iii)Kinetic energy is proportional to$1/ n^2$
   (iv) Angular momentum is proportional to n
   Choose the correct option from the codes given below.
   a) (i),(iii),(iv) are correct b) (i) is correct
   c) (i),(ii) are correct d) (iii) is correct

2. If elements with principal quantum number n> 4 not allowed in nature, the number of possible elements would be
   a) 60 b) 32 c)4 d)64

3. In a hypothetical bohr hydrogen atom, the mass of the electron is doubled. The energy $E_o$and energy r_o of the first orbit will be (a_o is the Bohr radius)
   a) $E_o = -27.2\text{eV}; r_o = a_o/2$ b) $E_o = -27.2\text{eV}; r_o = a_o$
   c) $E_o = -13.6\text{eV}; r_o = a_o/2$ d) $E_o = -13.6\text{eV}; r_o = a_o$

4. The electric potential between a proton and an electron is given by $V = V_0 \ln \frac{r}{r_0}$, where r_0 is a constant. Assuming Bohr's model to be applicable, write variation of r_n with n, n being the principal quantum number?
   a) $r_n \propto n$ b) $r_n \propto \frac{1}{n}$ c) $r_n \propto n^2$ d) $r_n \propto \frac{1}{n^2}$

5. The product of linear momentum and angular momentum of an electron of the hydrogen atom is proportional to n^x, where x is
   a) 0 b) 1 c) -2 d) 2

6. If series limit of Balmer series is 6400 Å, then series limit of Paschen series will be
   a) 6400 Å b) 18680 Å c) 14400 Å d)2400 Å

7. The energy of an electron in nth orbit of the hydrogen atom is given by $E_n = \frac{-13.6}{n^2}$ eV The energy required to raise an electron from the first orbit to the second orbit will be

a) 10.2 Ev b)12.1 eV c)13.6 eV d)3.4 Ev

8. Energy E of a hydrogen atom with principal quantum number n is given by $E = -\frac{13.6}{n^2}$ eV.The energy of a photon ejected when the electron jumps from n =3 state to $n = 2$state of hydrogen , is approximately

a) 1.5 eV b) 0.85 eV c) 3.4 eV d)1.9 eV

9 .In the Bohr model of a hydrogen atom, the centripetal force is furnished by the coulomb attraction between the proton and the electron. If $a_o$is the radius of the ground state orbit, m is the mass and e is charge on the electron and ε_o is the vacuum permittivity, the speed of the electron is

a) 0 b) $\frac{e}{\sqrt{\varepsilon_0 a_0 m}}$ c) $\frac{e}{\sqrt{4\pi\varepsilon_0 a_0 m}}$ d) $\sqrt{\frac{4\pi\varepsilon_0 a_0 m}{e}}$

10. The acceleration of electron in the first orbit of hydrogen atom is

a) $\frac{4\pi^2 m}{h^3}$ b) $\frac{h^2}{4\pi^2 mr}$ c) $\frac{h^2}{4\pi^2 m^2 r^3}$ d) $\frac{m^2 h^2}{4\pi^2 r^3}$

11. The figure indicates the energy levels of a certain atom. When the system moves from $2E$ level to$E$, a photon of wavelength λ is emitted. The wavelength of photon produced during its transition from $\frac{4E}{3}$level to E is

a) $\frac{\lambda}{3}$ b) $\frac{3\lambda}{4}$ c) $\frac{4\lambda}{3}$ d) 3λ

12. The ionisation potential of hydrogen atom is -13.6 eV. An electron in the ground state of a hydrogen atoms absorbs a photon of energy 12.75 eV. How many different spectral line can one expect when the electron make a downward transition?

a) 1 b) 4 c) 2 d) 6

13. If the shortest wavelength in the Lyman series is 911.6 Å, the longest wavelength in the same series will be

a) 1600 Å b) 2430Å c) 1215 Å d) ∞

14. The series limit wavelength of the Lyman series for the hydrogen atom is given by

a) $\frac{1}{R}$ b) $\frac{4}{R}$ c) $\frac{9}{R}$ d) $16/R$

15. The ratio of minimum wavelengths of Lyman and Balmer series will be

a) 1.25 b) 0.25 c) 5 d) 10

16. In the Bohr model of hydrogen atom, the electron is pictured to rotate in a circular orbit of radius 5×10^{-11} m, at a speed 2.2×10^{6} ms^{-1}. What is the current associated with electron motion?

a) 1.12 mA b) 3 mA c) 0.75 mA d) 2.25 mA

17. If the atom $_{100}Fm^{257}$ follows the Bohr model and the radius of $_{100}Fm^{257}$ is n times the Bohr radius, then find n.

a) 100 b) 200 c) 4 d) ¼

18. The energy of electron in the nth orbit of hydrogen atom is expressed as $En = \frac{-14.6}{n^2}$ eV. The shortest and longest wavelength of Lyman series will be

a) 910Å, 1213 Å b) 5463 Å , 7858 Å c) 1315 Å, 1530 Å d)None of these

19. In hydrogen atom, the electron is moving round the nucleus with velocity 2.18×10^{6} ms^{-1} in an orbit of radius 0.528 Å. The acceleration of the electron is

a) 9×10^{18} ms^{-2} b) 9×10^{22} ms^{-2} c) 9×10^{-22} ms^{-2} d) 9×10^{12} ms^{-2}

20. Rutherford's atomic model could account for
a) Concept of stationary orbits
b) The positively charged control core of an atom
c) Origin of spectra
d) Stability of atoms