PREVIOUS YEARS' QUESTIONS EXERCISE-II

1. The energy of an electron in the first Bohr orbit of H atom is – 13.6 eV . The possible energy value(s) of the excited state(s) for electrons in Bohr orbits of hydrogen is/are : **[JEE 1998]**

(1) – 3.4 eV (2) – 4.2 eV
(3) – 6.8 eV (4) + 6.8 eV

2. The number of nodal planes in a p_x orbital is: **[JEE 2000]**

(1) one (2) two
(3) three (4) zero

3. An atom has a mass of 0.02 kg and uncertainty in its velocity is 9.218×10^{-6} m/s then uncertainty in position is (h = 6.626×10^{-34} Js) **[AIEEE 2002]**

(1) 2.86×10^{-28} m (2) 2.86×10^{-32} cm
(3) 1.5×10^{-27} m (4) 3.9×10^{-10} m

4. Energy of H- atom in the ground state is –13.6 eV, Hence energy in the second excited state is- **[AIEEE 2002]**

(1) –6.8 eV (2) –3.4 eV
(3) –1.51 eV (4) –4.3 eV

5. Uncertainty in position of a particle of 25 g in space is 10^{-5} m. Hence uncertainty in velocity (ms^{-1}) is (Planck's constant h = 6.6×10^{-34} Js) **[AIEEE-2002]**

(1) 2.1×10^{-28} (2) 2.1×10^{-34}
(3) 0.5×10^{-34} (4) 5.0×20^{-24}

6. The orbital angular momentum for an electron revolving in an orbit is given by $\sqrt{\ell(\ell+1)} \cdot \frac{h}{2\pi}$. This momentum for an s-electron will be given by **[AIEEE-2003]**

(1) $\sqrt{2}.\frac{h}{2\pi}$ (2) $+\frac{1}{2}.\frac{h}{2\pi}$
(3) zero (4) $\frac{h}{2\pi}$

7. The number of d-electrons retained in Fe^{2+} (At. no. of Fe = 26) ion is : **[AIEEE-2003]**

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

8. The de Broglie wavelength of a tennis ball of mass 60 g moving with a velocity of 10 metres per second is approximately : **[AIEEE 2003]**

(1) 10^{-25} metres (2) 10^{-33} metres
(3) 10^{-31} metres (4) 10^{-16} metres

9. Which of the following sets of quantum number is correct for an electron in 4f orbital ? **[AIEEE-2004]**

(1) n = 3, l = 2, m = – 2, s = + 1/2
(2) n = 4, l = 4, m = – 4, s = – 1/2
(3) n = 4, l = 3, m = + 1, s = + 1/2
(4) n = 4, l = 3, m = + 4, s = + 1/2

10. Consider the ground state of Cr atom (Z = 24). The numbers of electrons with the azimuthal quantum numbers, l = 1 and 2 are, respectively **[AIEEE-2004]**

(1) 16 and 5 (2) 12 and 5
(3) 16 and 4 (4) 12 and 4

11. The wavelength of the radiation emitted, when in a hydrogen atom electron falls from infinity to stationary state 1, would be **[AIEEE-2004]**
(Rydberg constant = 1.097×10^7 m^{-1}) :

(1) 9.1×10^{-8} nm (2) 192 nm
(3) 406 nm (4) 91 nm

12. Which one of the following sets of ions represents the collection of isoelectronic species ? **[AIEEE-2004]**

(1) Na^+, Mg^{2+}, Al^{3+}, Cl^- (2) Na^+, Ca^{2+}, Sc^{3+}, F^-
(3) K^+, Cl^-, Mg^{2+}, Sc^{3+} (4) K^+, Ca^{2+}, Sc^{3+}, Cl^-

13. The radius of which of the following orbit is same as that of the first Bohr's orbit of hydrogen atom? **[JEE 2004]**

(1) He^+ (n = 2) (2) Li^{2+} (n = 2)
(3) Li^{2+} (n = 3) (4) Be^{3+} (n = 2)

14. In a multi-electron atom, which of the following orbitals described by the three quantum members will have the same energy in the absence of magnetic and electric fields ? **[AIEEE-2005]**

(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

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

15. Of the following sets which one does not contain isoelectronic species ? **[AIEEE-2005]**

(1) BO_3^{3-}, CO_3^{2-}, NO_3^- (2) SO_3^{2-}, CO_3^{2-}, NO_3^-
(3) CN^-, N_2, C_2^{2-} (4) PO_4^{3-}, SO_4^{2-}, ClO_4^-

16. Which of the following statements in relation to the hydrogen atom is correct ? **[AIEEE-2005]**

(1) 3s, 3p and 3d orbitals all have the same energy

(2) 3s and 3p orbitals are of lower energy than 3d orbitals

(3) 3p orbital is lower in energy than 3d orbital

(4) 3s orbitals is lower in energy than 3p orbital

17. According to Bohr's theory angular momentum of electron in 5th shell is :- **[AIEEE-2006]**

(1) 1.0 h/π (2) 10 h/π

(3) 2.5 h/π (4) 25 h/π

18. Uncertainty in the position of an electron (mass = 9.1×10^{-31} Kg) moving with a velocity 300 ms^{-1}, accurate upto 0.001%, will be :- (h = 6.63×10^{-34} Js)

[AIEEE-2006]

(1) 5.76×10^{-2} m (2) 1.92×10^{-2} m

(3) 3.84×10^{-2} m (4) 19.2×10^{-2} m

19. Which of the following sets of quantum numbers represents the highest energy of an atom ?

[AIEEE-2007]

(1) n = 3, l = 1, m =1, s = +½

(2) n = 3, l = 2, m =1, s = +½

(3) n = 4, l = 0, m =0, s = +½

(4) n = 3, l = 0, m =0, s = +½

20. The ionziation enthalpy of hydrogen atom is 1.312×10^6 J mol^{-1}. The energy required to excite the electron in the atom from n =1 to n =2 is

[AIEEE-2008]

(1) 8.51×10^5 J mol^{-1} (2) 6.56×10^5 J mol^{-1}

(3) 7.56×10^5 J mol^{-1} (4) 9.84×10^5 J mol^{-1}

21. In an atom, an electron is moving with a speed of 600 m/s with an accuracy of 0.005%. Certainity with which the position of the electron can be located is (h = 6.6×10^{-34} kg m^2 s^{-1}, mass of electron, e_m = 9.1×10^{-31} kg):- **[AIEEE-2009]**

(1) 1.92×10^{-3} m (2) 3.84×10^{-3} m

(3) 1.52×10^{-4} m (4) 5.10×10^{-3} m

22. Calculate the wavelength (in nanometer) associated with a proton moving at 1.0×10^3 ms^{-1} (Mass of proton = 1.67×10^{-27} kg and h = 6.63×10^{-34} Js):-

[AIEEE-2009]

(1) 2.5 nm (2) 14.0 nm

(3) 0.032 nm (4) 0.40 nm

23. Ionisation energy of He^+ is 19.6×10^{-18} J atom^{-1}. The energy of the first stationary state (n = 1) of Li^{2+} is:-

[AIEEE-2010]

(1) 8.82×10^{-17} J atom^{-1}

(2) 4.41×10^{-16} J atom^{-1}

(3) -4.41×10^{-17} J atom^{-1}

(4) -2.2×10^{-15} J atom^{-1}

24. The frequency of light emitted for the transition n = 4 to n = 2 of He^+ is equal to the transition in H atom corresponding to which of the following

[AIEEE-2011]

(1) n = 3 to n = 1 (2) n = 2 to n = 1

(3) n = 3 to n = 2 (4) n = 4 to n = 3

25. The electrons identified by quantum numbers n and ℓ :- **[AIEEE-2012]**

(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

(1) (a) < (c) < (b) < (d) (2) (c) < (d) < (b) < (a)

(3) (d) < (b) < (c) < (a) (4) (b) < (d) < (a) < (c)

26. The kinetic energy of an electron in the second Bohr orbit of a hydrogen atom is [a_0 is Bohr radius]

[JEE 2012]

(1) $\frac{h^2}{4\pi^2 m a_0^2}$ (2) $\frac{h^2}{16\pi^2 m a_0^2}$

(3) $\frac{h^2}{32\pi^2 m a_0^2}$ (4) $\frac{h^2}{32\pi^2 m a_0^2}$

PREVIOUS YEARS QUESTIONS				ANSWER KEY						Exercise-II
Que.	1	2	3	4	5	6	7	8	9	10
Ans.	1	1	1	3	1	3	1	2	3	2
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	4	4	4	1	2	1	3	2	2	4
Que.	21	22	23	24	25	26				
Ans.	1	4	3	2	3	3				