

**JEE CHEMISTRY**

*Topic: Atomic Structure*

- Q.1 Proton is -  
(A) Nucleus of deuterium  
(B) Ionised hydrogen molecule  
(C) Ionised hydrogen atom  
(D) An  $\alpha$ -particle
- Q.2 Which is not deflected by magnetic field -  
(A) Neutron (B) Electron and Neutron  
(C) Proton (D) Electron
- Q.3 A 1-kW radio transmitter operates at a frequency of 880 Hz. How many photons per second does it emit -  
(A)  $1.71 \times 10^{21}$  (B)  $1.71 \times 10^{33}$  (C)  $6.02 \times 10^{23}$  (D)  $2.85 \times 10^{26}$
- Q.4 On Bohr's stationary orbits -  
(A) Electrons do not move  
(B) Electrons move emitting radiations  
(C) Energy of the electron remains constant  
(D) Angular momentum of the electron is  $h/2\pi$
- Q.5 Wave number of a spectral line for a given transition is  $x \text{ cm}^{-1}$  for  $\text{He}^+$ , then its value for  $\text{Be}^{3+}$  for the same transition is -  
(A)  $4x \text{ cm}^{-1}$  (B)  $x \text{ cm}^{-1}$   
(C)  $x/4 \text{ cm}^{-1}$  (D)  $2x \text{ cm}^{-1}$
- Q.6 A photon was absorbed by a hydrogen atom in its ground state and the electron was promoted to the fifth orbit. When the excited atom returned to its ground state, visible and other quanta were emitted. Other quanta are -  
(A)  $2 \rightarrow 1$  (B)  $5 \rightarrow 2$  (C)  $3 \rightarrow 1$  (D)  $4 \rightarrow 1$

Q.7 How many electrons can fit into the orbitals that comprise the 3rd quantum shell  $n = 3$  -

- (A) 2                      (B) 8  
(C) 18                     (D) 32

Q.8 The shape of the orbital is given by -

- (A) Spin quantum number  
(B) Magnetic quantum number  
(C) Azimuthal quantum number  
(D) Principal quantum number

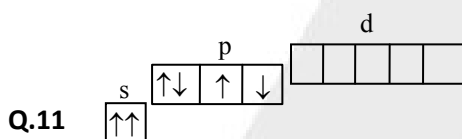
Q.9 For  $4p_y$  orbital : There are -

nodal plane = ..... and azimuthal quantum number  $\ell =$

- (A) 1, 0    (B) 0, 1    (C) 1, 1    (D) 2, 1

Q.10 The maximum probability of finding electron in the  $d_{xy}$  orbital is -

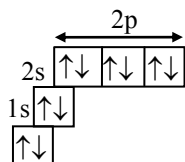
- (A) Along the x axis                      (B) Along the y axis  
(C) At an angle of  $45^\circ$  from the x and y axis  
(D) At an angle of  $90^\circ$  from the x and y axis



The above configuration is not correct as it violates -

- (A) Only Hund's rule  
(B) Only Pauli's exclusion principle  
(C)  $(n + \ell)$  rule  
(D) (Hund + Pauli) rule

Q.12 Which of the following elements is represented by the electronic configuration -



- (A) Nitrogen                      (B) Fluorine  
(C) Oxygen                        (D) Neon

Q.13 A 200g cricket ball is thrown with a speed of  $3.0 \times 10^3 \text{ cm sec}^{-1}$ . What will be its de Broglie's wavelength - [ $h = 6.6 \times 10^{-27} \text{ g cm}^2 \text{ sec}^{-1}$ ]

- (A)  $1.1 \times 10^{-32} \text{ cm}$             (B)  $2.2 \times 10^{-32} \text{ cm}$  (C)  $0.55 \times 10^{-32} \text{ cm}$             (D)  $11.0 \times 10^{-32} \text{ cm}$

Q.14 Which is the de-Broglie equation -

- (A)  $h = p\lambda$                       (B)  $h = p\lambda^{-1}$                       (C)  $h = \lambda p^{-1}$                       (D)  $h = p + \lambda$

Q.15 Which of the following has the largest de Broglie wavelength given that all have equal velocity -

- (A)  $\text{CO}_2$  molecule                (B)  $\text{NH}_3$  molecule  
(C) Electron                        (D) Proton

Q.16 The energy difference between two electronic states is 46 .12 kcal /mole. What will be the frequency of the light emitted when an electron drops from the higher to the lower energy state

(Planck's constant =  $9.52 \times 10^{-14} \text{ kcal sec mole}^{-1}$ )

- (A)  $4.84 \times 10^{15} \text{ cycles sec}^{-1}$   
(B)  $4.84 \times 10^{-5} \text{ cycles sec}^{-1}$   
(C)  $4.84 \times 10^{-12} \text{ cycles sec}^{-1}$   
(D)  $4.84 \times 10^{14} \text{ cycles sec}^{-1}$

Q.17 If the kinetic energy of an electron is increased 4 times, the wavelength of the de Broglie wave associated with it would become :

- (A) 4 times  
(B) 2 times  
(C)  $\frac{1}{2}$  times  
(D)  $\frac{1}{4}$  times

Q.18 Uncertainty in position and momentum are equal. Uncertainty in velocity is -

- (A)  $\sqrt{\frac{h}{\pi}}$                       (B)  $\sqrt{\frac{h}{2\pi}}$   
(C) Both                      (D)  $\frac{1}{2m} \sqrt{\frac{h}{\pi}}$

Q.19 For any H like system, the ratio of velocities of I, II & III orbit i.e.  $V_1 : V_2 : V_3$  will be -

- (A) 1 : 2 : 3                      (B) 1 : 1/2 : 1/3  
(C) 3 : 2 : 1                      (D) 1 : 1 : 1

Q.20 How fast is an electron moving if it has a wavelength equal to the distance it travels in one second -

- (A)  $\sqrt{\frac{h}{m}}$                       (B)  $\sqrt{\frac{m}{h}}$   
(C)  $\sqrt{\frac{h}{p}}$                       (D)  $\sqrt{\frac{h}{2(KE)}}$

Q.21 In an atom two electrons move around the nucleus in circular orbits of radii R and 4R. The ratio of the time taken by them to complete one revolution -

- (A) 1 : 4                      (B) 4 : 1  
(C) 1 : 8                      (D) 8 : 7

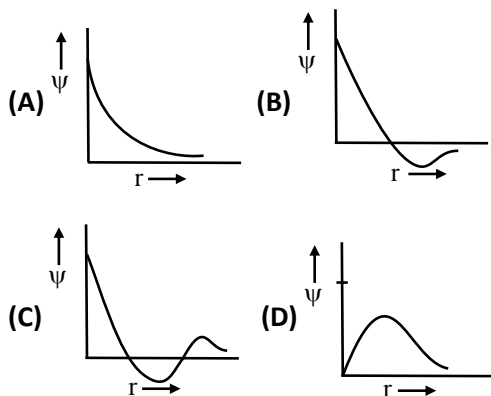
Q.22 A beam of electrons is accelerated by a potential difference of 10000 volts. The wavelength of the wave associated with it will be -

- (A) 0.0123 Å                      (B) 1.23 Å  
(C) 0.123 Å                      (D) None of these

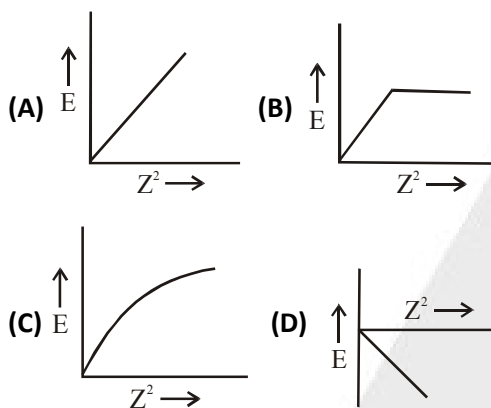
Q.23 If the number of electrons in p-orbital are two, then which one of the following is in accordance with Hund's rule -

- (A)  $p_x^2 p_y^0 p_z^0$                       (B)  $p_x^0 p_y^2 p_z^0$   
(C)  $p_x^0 p_y^0 p_z^2$                       (D)  $p_x^1 p_y^1 p_z^0$

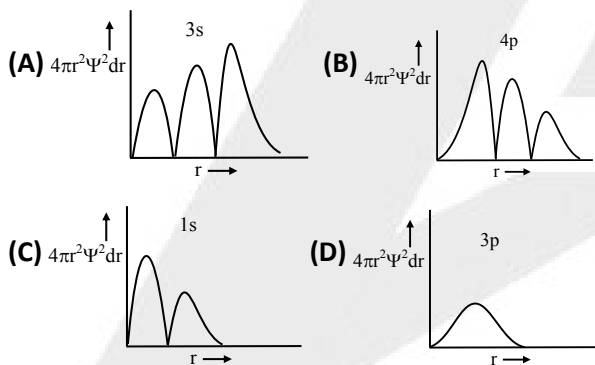
Q.24 Which of the following graphs correspond to one node ?



Q.25 The graphical representation of energy of  $e^-$  and atomic number is :



Q.26 Which of the following is correct radial probability distribution curve for various orbitals ?



Q.27 The energies  $E_1$  and  $E_2$  of two radiations are 25 eV and 50 eV respectively. The relation between their wavelengths i.e.  $\lambda_1$  and  $\lambda_2$  will be:

- (A)  $\lambda_1 = \frac{1}{2} \lambda_2$       (B)  $\lambda_1 = \lambda_2$   
 (C)  $\lambda_1 = 2\lambda_2$       (D)  $\lambda_1 = 4\lambda_2$

Q.28 The momentum of a photon with energy 20 eV is -

- (A)  $10.66 \times 10^{-27} \text{ Kg m sec}^{-1}$       (B)  $10.55 \times 10^{-27} \text{ Kg m sec}^{-1}$   
 (C)  $10.60 \times 10^{-27} \text{ Kg m sec}^{-1}$       (D)  $10.80 \times 10^{-27} \text{ Kg m sec}^{-1}$

Q.29 The nitride ion in lithium nitride is composed of:

- (A) 7 protons + 10 electrons
- (B) 10 protons + 10 electrons
- (C) 7 protons + 7 protons
- (D) 10 protons + 7 electrons

Q.30 The emission spectrum of hydrogen is found to satisfy the expression for the energy change.

$\Delta E$  (in joules) such that  $\Delta E = 2.18 \times 10^{-18} \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \text{J}$ . Where  $n_1=1, 2, 3, \dots$  and  $n_2 = 2, 3, 4, \dots$ . The spectral lines

that correspond to Paschen series have :

- (A)  $n_1 = 1$  and  $n_2 = 2, 3, 4$
- (B)  $n_1 = 3$  and  $n_2 = 4, 5, 6$
- (C)  $n_1 = 1$  and  $n_2 = 3, 4, 5$
- (D)  $n_1 = 2$  and  $n_2 = 3, 3, 5$

## ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	C	A	B	C	A	A	C	C	C	C
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	D	D	A	A	C	D	C	D	B	A
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	C	C	D	B	D	A	C	A	A	B