

Topic : Atomic Structure

Type of Questions

Single choice Objective ('-1' negative marking) Q.1 to Q.9

(3 marks, 3 min.)

M.M., Min.

[27, 27]

- Which of the following quantum numbers has not been derived from Schrodinger wave equation :
 (A) Principal quantum number (n) (B) Subsidiary quantum number (ℓ)
 (C) Magnetic quantum number (m) (D) Spin quantum number (s)
- Which d-orbital does not have four lobes :
 (A) $d_{x^2-y^2}$ (B) d_{xy} (C) d_{yz} (D) d_{z^2}
- The total number of subshells in n^{th} main energy level are :
 (A) n^2 (B) $2n^2$ (C) $(n-1)$ (D) n.
- Which of the following orbital does not make sense :
 (A) 3d (B) 3f (C) 5p (D) 7s.
- The maximum number of electrons that can be accommodated in s, p and d-subshells respectively are :
 (A) 2 in each (B) 2, 6 and 6 (C) 2, 6 and 10 (D) 2, 6 and 12.
- Any p-orbital can accommodate upto :
 (A) four electrons (B) two electrons with parallel spin
 (C) six electrons (D) two electrons with opposite spin.
- In which transition, the change in de-Broglie wavelength of electron is maximum :
 (A) $n = 8 \rightarrow n = 6$ (B) $n = 5 \rightarrow n = 4$ (C) $n = 3 \rightarrow n = 2$ (D) $n = 2 \rightarrow n = 1$
- S₁** : Photoelectric effect can be explained on the basis of wave nature of electromagnetic radiations.

S₂ : An orbital represented by $n = 2, \ell = 1$ is dumb-bell shaped.

S₃ : d_{xy} orbital has zero probability of finding electrons along X-axis and Y-axis.

(A) FTF (B) FTT (C) TFT (D) TFF
- S₁** : According to Bohr model, the angular momentum of revolving electron is directly proportional to the atomic number of H-like species bearing the electron.

S₂ : An orbital cannot accommodate more than 2 electrons.

S₃ : All orbitals have directional character.

(A) FTF (B) TFF (C) FFT (D) TTF

Answer Key

DPP No. # 19

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|----|-----|----|-----|----|-----|----|-----|----|-----|
| 1. | (D) | 2. | (D) | 3. | (D) | 4. | (B) | 5. | (C) |
| 6. | (D) | 7. | (A) | 8. | (B) | 9. | (A) | | |

Hints & Solutions

DPP No. # 19

1. Only Spin quantum number (s) is not derived from Schrodinger wave equation.
5. number of electrons in subshells = $2(2l + 1)$
7. For $n = 8$ to $n = 6$, energy difference is minimum and $\lambda \propto \frac{1}{\text{Energy}}$
8. S_1 : Photoelectric effect can be explained on the basis of particle nature of electromagnetic radiations.
 S_2 : $n = 2, \ell = 1 \therefore$ 2p-orbital $\therefore$ dumb-bell shaped.
 S_3 : d_{xy} orbital has its lobes directed at an angle of 45° from X-axis and Y-axis. So, it has zero probability of finding electrons along X-axis and Y-axis.
9. S_1 : Angular momentum = $mvr = n\left(\frac{h}{2\pi}\right) \therefore$ Angular momentum $\propto n$.
 S_2 : An orbital can only accomodate 2 electrons with opposite spin.
 S_3 : s-orbital is non-directional in nature, rest all orbitals are directional.