PHYSICAL CHEMISTRY

DPP

DAILY PRACTICE PROBLEMS

DPP No. 19

Total Marks : 27

Max. Time : 27 min.

Topic : Atomic Structure

Type of Questions		M.M., Min.
Single choice Objective ('–1' negative marking) Q.1 to Q.9	(3 marks, 3 min.)	[27, 27]

1. 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)

2. Which d -orbital does not has four lobes :

(A) $d_{x^2-y^2}$ (B) d_{xy} (C) d_{yz} (D) d_{z^2}

3. The total number of subshells in n^{th} main energy level are :

(A) n^2 (B) $2n^2$ (C) (n–1) (D) n.

4. Which of the following orbital does not make sense :

(A) 3d (B) 3f (C) 5p (D) 7s.

5. The maximum number of electrons that can be accomodated 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.

6. Any p-orbital can accommodate upto :

(A) four electrons (B) two electrons with parallel spin

(C) six electrons (D) two electrons with opposite spin.

7. 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) $n = 2 \rightarrow n = 1$

8. **S_1 :** Photoelectric effect can be explained on the basis of wave nature of electromagnetic radiations.

S_2 : An orbital represented by n = 2, ℓ = 1 is dumb-bell shaped.

S_3 : d_{xy} orbital has zero probability of finding electrons along X-axis and Y-axis.

(A) FTF (B) FTT (C) TFT (D) TFF

9. **S_1 :** According to Bohr model, the angular momentum of revolving electron is directly proportional to the atomic number of H-like species bearing the electron.

S_2 : An orbital cannot accomodate more than 2 electrons.

S_3 : All orbitals have directional character.

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

Answer Key

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

Hints & Solutions

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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.