

18. How many orientations are possible for  $p$  and  $f$ -orbitals ?

Ans. Number of orientations possible for  $p$  and  $f$  orbitals are 3 and 7 respectively.

19. How many Nodal Planes are present in  $3d_{x^2-y^2}$  and  $3p_z$  orbital ?

Ans. The  $3d_{x^2-y^2}$  has zero number of nodes whereas  $3p_z$  orbital has one node.

20. Are orbits and orbital same ?

Ans. Orbit is a circular path in which electron revolves whereas orbital is a region of space around the nucleus where there is maximum probability of locating the electron.

21. An electron is present in  $5d$  orbital. Give the possible values for its four quantum numbers.

Ans. An electron present in  $5d$  orbital has following possible values for its four quantum numbers:

$$n = 5, \quad l = 2, \quad m = -2, -1, 0, +1, +2, \quad m_s = +1/2, -1/2$$

22. Can we have  $5g$  subshell ? How many orbitals are possible for this subshell.

Ans. Yes,  $5g$  subshell is possible and can have nine orbitals.

28. What does the term degenerate orbitals mean ?

Ans. The orbitals having same energy are called degenerate orbitals.

29. Why s-orbitals have spherical shape ?

Ans. The complete wave functions in the 's' orbitals is independent of two polar coordinates  $\theta$  and  $\phi$  so an 's' orbital is symmetrical along all directions.

30. State Bohr Bury's rule.

Ans. Bohr Bury's rule states that orbitals are filled in order of increasing value of  $n+l$ .

31. Write down the increasing order of energy of various orbitals.

Ans. Increasing order of energy of various orbitals is :

$1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d$ .

32. Write electronic configuration of Cr ( $Z = 24$ ) and Cu ( $Z = 29$ ).

Ans. Electronic configurations :

Cr :  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$

Cu :  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$

33. What is Electronic configuration of Nitrogen. (At. No. 7) ?

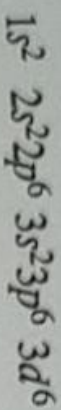
Ans. Electronic configuration of N :  $1s^2 2s^2 2p^3$

34. How many unpaired electrons are present in Cr ( $Z = 24$ ).

Ans. Six unpaired electrons are present in Cr ( $Z=24$ )

35. What is the electronic configuration of  $\text{Fe}^{2+}$  (Atomic no. 26).

Ans. Electronic configuration of  $\text{Fe}^{2+}$  :



36. How can you explain screening effect ?

Ans. Reduction of effect of the nuclear charge on the electrons present in higher energy orbitals due to the intervening orbitals.

37. What is meant by Exclusion in 'Pauli Exclusion Principle' ?

Ans. According to 'Pauli's exclusion principle', if one electron has one set of quantum numbers, then all other electrons of this atom are excluded from the possibility to have that same set of quantum numbers.

## LONG ANSWER QUESTIONS

1. What is an atom according to Rutherford's nuclear model of the atom ? How stability of an atom is ensured while Niels Bohr pointed out Rutherford's atom to be highly unstable ?

2. Discuss important postulates of Bohr's Theory.

3. What are the limitations of Bohr's Theory?

4. State and explain Heisenberg's uncertainty principle. Write how principle goes against Bohr's theory?

5. Deduce de Broglie equation. What was the experimental support to this equation ?

6. Obtain the relation among the cartesian coordinates  $x, y, z$  and polar coordinates  $r, \theta, \phi$ . What are radial and angular wave functions in Schrödinger wave equation ? Explain.