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Questions:

IV. ANSWER ANY FOUR QUESTIONS

1. State and explain pauli exclusion principle.
2. What is the de Broglie wavelength (in cm) of a 160 g cricket ball travelling at 140 Km hr $^{-1}$.
3. What is the de Broglie wave length of an electron, which is accelerated from the rest, through a potential difference of 100 V ?
4. Identify the missing quantum numbers and the sub energy level

n	l	m	Sub energy level
?	?	0	4d
3	1	0	?
?	?	?	5p
?	?	-2	3d

5. An atom of an element contains 35 electrons and 45 neutrons. Deduce
   (i) the number of protons
   (ii) the electronic configuration for the element
   (iii) All the four quantum numbers for the last electron
6. What is exchange energy? How it is related with stability of atoms? Explain with suitable examples.
7. Derive de-Broglie wave length.
8. i) Describe the Aufbau principle.
   ii) What is effective nuclear charge ?

III. ANSWER ANY FOUR QUESTIONS

9. Give the electronic configuration of Mn^{2+} and Cr^{3+}
10. State Hund's rule of maximum multiplicity.
11. What is Zeeman effect?
12. State Heisenberg's uncertainty principle and give its mathematical expression
13. How many unpaired electrons are present in the ground state of Fe^{3+} (z = 26), Mn^{2+}(z = 25) and argon (z = 18)?
14. Explain the meaning of the symbol $4f^2$. Write all the four quantum numbers for these electrons.
15. Calculate the total number of angular nodes and radial nodes present in 3d and 4f orbitals.

II. ANSWER ANY FOUR QUESTIONS

16. The stabilisation of a half filled d - orbital is more pronounced than that of the p-orbital why?
17. How many orbitals are possible for n = 4?
18. How many radial nodes for 2s, 4p, 5d and 4f orbitals exhibit? How many angular nodes
19. Which quantum number reveal information about the shape, energy, orientation and size of orbitals?
20. Calculate the uncertainty in the position of an electron, if the uncertainty in its velocity is 5.7 x 10^5 ms^{-1}.
21. How many orbitals are possible in the 4^{th} energy level? (n = 4)
22. Which ion has the stable electronic configuration? Ni^{2+} or Fe^{3+}.

I. ANSWER ALL THE QUESTIONS

23. According to the Bohr Theory, which of the following transitions in the hydrogen atom will give rise to the least energetic photon?
    (a) n = 6 to n = 1 (b) n = 5 to n = 4 (c) n = 5 to n = 3 (d) n = 6 to n = 5
24. Two electrons occupying the same orbital are distinguished by _____
    (a) azimuthal quantum number (b) spin quantum number (c) magnetic quantum number (d) orbital quantum number
25. The maximum number of electrons in a sub shell is given by the expression _____
    (a) $2n^2$ (b) 2l + 1 (c) 4l + 2 (d) none of these
26. What is the maximum numbers of electrons that can be associated with the following set of quantum numbers? n = 3, I = 1 and m =-1
    (a) 4 (b) 6 (c) 2 (d) = 10
27. The total number of orbitals associated with the principal quantum number n = 3 is _____
    (a) 9 (b) 8 (c) 5 (d) 7
28. If n = 6, the correct sequence for filling of electrons will be _____
    (a) ns → (n-2)f → (n - 1)d → np (b) ns → (n - 1) d → (n - 2) f → np (c) ns → (n-2)f →np → (n-1)d (d) none of these are correct
29. How many electrons in an atom with atomic number 105 can have (n + 1) = 8 ?
    (a) 30 (b) 17 (c) 15 (d) unpredictable
30. If uncertainty in position and momentum are equal, then minimum uncertainty in velocity is _____
    (a) $\frac{1}{m}\sqrt{\frac{h}{\pi}}$ (b) $\sqrt{\frac{h}{\pi}}$ (c) $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$ (d) $\frac{h}{4\pi}$
31. The energy of an electron in the 3rd orbit of hydrogen atom is -E. The energy of an electron in the first orbit will be _____
    (a) -3E (b) $\frac{-E}{3}$ (c) $\frac{-E}{9}$ (d) -9E
32. Assertion: The spectrum of He^+ is expected to be similar to that of hydrogen
    Reason: He^+ is also one electron system.

(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are reason are true but reason is not the correct explanation of assertion (c) If assertion is true but reason is false
(d) If both assertion and reason are false

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