1 CHAPTER

GENERAL CHEMISTRY

EXERCISE-1

[SINGLE CORRECT CHOICE TYPE]

Q.1 Select the correct statement for Ne.

(A) It is not isoelectronic with O^{-2}

(B) Last electron enters in s-orbital

(C) The value of 'm' must be zero for last electron

(D) The value of '*l*' must be '1' for last electron

Q.2 The correct set of quantum numbers for the last electron of Na^{+} is

(A) 3, 0, 0, $-\frac{1}{2}$ (B) 3, 1, 0, $+\frac{1}{2}$ (C) 3, 1, 1, $+\frac{1}{2}$ (D) 2, 1, 0, $-\frac{1}{2}$

Q.3 The penetrating power of the orbitals for a particular principal quantum number runs as

(A) s < p < d < f (B) p > d > f > s (C) f > p > d > s (D) s > p > d > f

Q.4 If possible values of spin quantum numbers are 3 i.e. $-\frac{1}{2}$, 0, $+\frac{1}{2}$. The permissible values of other quantum numbers and rules for filling of orbitals remains unchanged, then number of elements in 4^{th} period is

(A) 27 (B) 18 (C) 9 (D) 54

Q.5 If each orbital were containing three electrons, then the ground state electronic configuration of iron were:

(A) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^6$ (B) $1s^3\ 2s^3\ 2p^6\ 3s^3\ 3p^6\ 4s^3\ 3d^2$

(C) $1s^3\ 2s^3\ 2p^9\ 3s^3\ 3p^8$ (D) $1s^3\ 2s^3\ 2p^6\ 3s^3\ 3p^6\ 3d^5$

Q.6 The sum of azimuthal quantum number of the orbital whose electron cause maximum screening and the one whose cause minimum screening (for same value of 'n') is equal to

(A) The value of principal quantum number

(B) Number of different orbitals present in a shell

(C) Number of different subshells possible in a shell.

(D) Shell number of the penultimate shell.

Q.7 If an electron has the quantum numbers : m = 3 and s = $-\frac{1}{2}$, it may belong to :

(A) s - subshell (B) p - subshell (C) d - subshell (D) f - subshell

Q.8 Which of the following set of Quantum numbers is not possible?

(A) n = 4, ℓ = 3, m = + 2, s = +1/2 (B) n = 4, ℓ = 2, m = + 2, s = –1/2

(C) n = 4, ℓ = 2, m = – 2, s = +1/2 (D) n = 4, ℓ = 1, m = – 2, s = –1/2

Q.9 The total number of orbitals with n + ℓ = 10, is

(A) 5 (B) 16 (C) 25 (D) 36

Q.10 An electron, that has quantum numbers : n = 4 and m = –3

(A) must have s = $-\frac{1}{2}$ (B) must have ℓ = 3

(C) may have ℓ = 0, 1, 2, 3 (D) may have ℓ = 3, 4

Q.11 The ground state electronic configuration of Chromium and Silicon are :

(A) Cr : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6$
Si : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$

(B) Cr : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^4$
Si : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$

(C) Cr : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$
Si : $1s^2\ 2s^2\ 2p^6\ 3s^1\ 3p^3$

(D) Cr : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$
Si : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$

Q.12 In ground state of phosphorus atom (Z = 15), the numbers of occupied sub-shells and occupied orbitals are respectively

(A) 3, 3 (B) 5, 9 (C) 5, 5 (D) 3, 6

Q.13 Quantum numbers of some electrons are given below on the basis of it, arrange them from lowest to highest energy order.

	n	l	m	s
I	4	1	0	$\frac{1}{2}$
II	5	0	0	$-\frac{1}{2}$
III	6	2	0	$+\frac{1}{2}$
IV	6	3	–1	$+\frac{1}{2}$

(A) I < II < III < IV (B) II < III < I < IV (C) II < III < IV < I (D) IV < II < III < I

Q.14 "Electron pairing cannot occur in *p*, *d* and *f*-orbitals until each orbital of a given subshell contains one electron". This is known as

(A) Aufbau's rule (B) Pauli's exclusion principle
(C) Hund's rule (D) Fajan's rule

Q.15 Which of the following set of quantum numbers is **correct** for last electron of fluorine atom?

(A) n = 2, *l* = 1, m = 0, s = 1/2 (B) n = 2, *l* = 1, m = 0, s = –1/2
(C) n = 2, *l* = 0, m = 0, s = +1/2 (D) n = 2, *l* = 1, m = 1, s = 1/2

Q.16 Find the species having highest value of magnetic moment in their ground state.

(A) Cu^{+} (B) Cr^{3+} (C) Mn^{2+} (D) Ni^{2+}

Q.17 In ground state of phosphorus atom (Z = 15), the numbers of occupied sub-shells and occupied orbitals are respectively

(A) 3, 3 (B) 5, 9 (C) 5, 5 (D) 3, 6

Q.18 Which of the following has maximum unpaired electrons?

(A) Fe^{3+} (B) Fe^{2+} (C) Mn^{3+} (D) Sc^{3+}

Q.19 The number of elements which should be theoreitcally present in 8^{th} period of the modern long form of periodic table, is

(A) 32 (B) 40 (C) 50 (D) 48

Q.20 The correct option regarding size of orbitals is :

(A) 3p > 4p > 5p (B) 3p < 4p = 5p
(C) 3p < 4p < 5p (D) 3p = 4p = 5p

Q.21 If Aufbau rule is not followed, Potassium atomic number -19 will be placed in

(A) s-block (B) p-block (C) d-block (D) f-block

Q.22 If spin quantum number have the values $+\frac{1}{2}$, 0 and $-\frac{1}{2}$ but all other quantum number have values as they have, then the maximum number of electrons in 5^{th} orbit should be

(A) 25 (B) 50 (C) 75 (D) 33

Q.23 The correct option regarding size of orbitals is :

(A) 2p > 3p > 4p > 5p (B) 2p = 3p < 4p = 5p

(C) 2p < 3p < 4p < 5p (D) 2p = 3p = 4p = 5p

Q.24 Azimuthal and Magnetic quantum numbers are respectively related to :

(A) shape and orientation (B) size and orientation

(C) orientation and shape (D) none of these

Q.25 If an electron has spin quantum number of $+\frac{1}{2}$ and magnetic quantum number of –1 it cannot be present in

(A) f-orbital (B) d-orbital (C) p-orbital (D) s-orbital

Q.26 For a 7s electron the values of n,*l*,m,s respectively could be:

(A) 7,4,4,+1/2 (B) 7,2,0,+1/2 (C) 7,1,0,+1/2 (D) 7,0,0, +1/2

Q.27 What type of orbital is designated n = 2, ℓ = 3, m_ℓ = –2 ?

(A) 4p (B) 4d (C) 4f (D) None

Q.28 The correct set of quantum numbers for the unpaired electron of Bromine atom is

	n	*l*	m		n	*l*	m
(A)	2	1	0	(B)	2	1	1
(C)	4	1	1	(D)	3	0	0

Q.29 Which of the following sets of quantum numbers represent an impossible arrangement

	n	*l*	m	m_s		n	*l*	m	m_s
(A)	3	2	–2	$\frac{1}{2}$	(B)	4	0	0	$\frac{1}{2}$
(C)	3	0	–1	$\frac{1}{2}$	(D)	5	3	0	$\frac{1}{2}$

Q.30 Which of the following has maximum number of unpaired electron (atomic number of Fe = 26)

(A) Fe (B) Mn^{2+} (C) Fe (III) (D) Both (B) and (C)

Q.31 Currently, the last element in group 18 is Radon, Rn(z = 86). Based on the building up principle, what would be the abbreviated ground state configuration for next element in group 18 should it be discovered.

(A) [Rn] - $7s^2\ 5f^{14}\ 6d^{10}\ 7p^2$

(B) [Rn] - $6s^2\ 4f^{14}\ 5d^{10}\ 6p^6$

(C) [Rn] - $7s^2\ 6d^{10}\ 7p^6$

(D) [Rn] - $7s^2\ 5f^{14}\ 6d^{10}\ 7p^6$

Q.32 Orbital angular momentum of electron in hydrogen depends on.

(A) *l* and m (B) n and *l* (C) n and m (D) m and s

Q.33 Subshell which has maximum value of (n + *l* + m) quantum numbers in $_{27}Co$ is :

(A) 3p (B) 3d (C) 4d (D) 4s

Q.34 X^-, Y^{-2} and Z^{-3} are isotonic and isoelectronic. Thus increasing order of atomic number of X, Y and Z is

(A) X < Y < Z (B) Z < Y < X (C) X = Y = Z (D) Z < X < Y

Q.35 For the following set of quantum numbers

$n = 4;\ l = 4;\ m_l = 0$

(A) It describes an electron in 4f orbital

(B) It describes one of the seven orbitals of a subshell

(C) It describes an electron in a 4g-orbital

(D) It is not allowed

Q.36 Which of the following sets of quantum number describes the electron which is removed most easily from Cu atom in its ground state:

(A) n = 3; l = 2 ; m = 0 ; s = $+\frac{1}{2}$ (B) n = 3; l = 1 ; m = 1 ; s = $-\frac{1}{2}$

(C) n = 4; l = 0 ; m = 0 ; s = $+\frac{1}{2}$ (D) n = 3; l = 2 ; m = 1 ; s = $+\frac{1}{2}$

Q.37 Which of the following is **correct** for compounds:

(A) They are same as mixture

(B) Compound can be separated in its components by a physical process

(C) They have different type of atoms chemically combined in fixed mass ratio.

(D) All are correct

Q.38 Select the **correct** option regarding number of sub-atomic particles in nucleus of $^{238}_{92}U$:

(A) n = 146 ; p = 92 ; e^- = 92 (B) n = 238 ; p = 92 ; e^- = 92

(C) n = 146 ; p = 92 ; e^- = 0 (D) n = 92 ; p = 146 ; e^- = 92

Q.39 If Hund's rule of maximum multiplicity is violated then which of the following species will be paramagnetic?

(A) Fe^{+2} (B) Mn^{+5} (C) Cu^{+2} (D) Cr^{+2}

Q.40 Select the **impossible** arrangement(s) of quantum numbers -

	n	***l***	$\mathbf{m_l}$	**s**		**n**	***l***	$\mathbf{m_l}$	**s**
(A)	4	3	– 3	$+\frac{1}{2}$	(B)	3	0	– 1	$-\frac{1}{2}$
(C)	2	1	– 1	$+\frac{1}{2}$	(D)	1	0	0	$-\frac{1}{2}$

Q.41 Which of the following is not characterized by principal quantum number(n) ?

(A) shell (B) size of the atomic orbital

(C) Energy of atomic orbital (D) spatial orientation of atomic orbital

Q.42 **Correct** electronic configuration of La(57) is :

(A) $[_{54}Xe]$, $4f^0$, $5d^1$, $6s^2$ (B) $[_{54}Xe]$, $4f^1$, $5d^0$, $6s^2$

(C) $[_{86}Rn]$, $5f^0$, $6d^1$, $7s^2$ (D) $[_{86}Rn]$, $5f^1$, $6d^0$, $7s^2$

Q.43 Select the **incorrect** statement:

(A) Zn^{+2}, Cu^{+} and Cu have same number of d-electrons.

(B) Electron having n = 4; l = 2; m = 0; s = $+\frac{1}{2}$ values of quantum number is present in one of the five degenerate atomic orbitals

(C) For any value of l, $2(2l + 1)$ values of m are possible.

(D) There are 2 unpaired electrons in Mn^{+5}.

Q.44 Which of the following is not a pair of isodiaphers:

(A) $^{208}_{84}Po$, $^{204}_{82}Pb$ (B) $^{234}_{92}U$, $^{230}_{90}Th$ (C) $^{222}_{88}Ra$, $^{218}_{86}Rn$ (D) $^{234}_{92}U$, $^{235}_{92}U$

Q.45 Select the electronic configuration which does not belongs to d-block element:

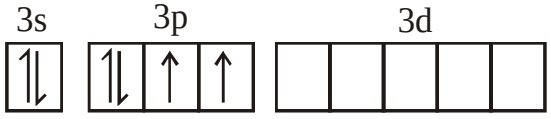
(A) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2$ (B) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^1$

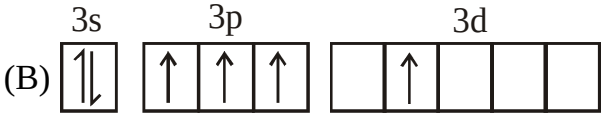
(C) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$ (D) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^1$

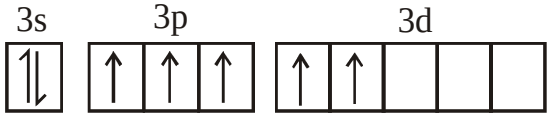
Q.46 Maximum value of spin multiplicity for electrons in Cr atom is -

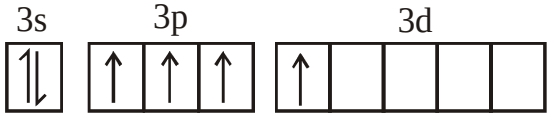
(A) 5 (B) 2 (C) 3 (D) 7

Q.47 Which of the following has maximum energy ?

(A) 

(B) 

(C) 

(D) 

Q.48 Maximum possible number of elements present in 4^{th} period

(A) 9 (B) 16 (C) 32 (D) 18

Q.49 Number of electrons in Cu atom having $(n + l + m) = 4$ is -

(A) 1 (B) 3 (C) 5 (D) 7

Q.50 For Cr(24) calculate number of electrons having $n + l = 4$

(A) 5 (B) 1 (C) 6 (D) 7

Q.51 In the ground state of Cr, the number of electrons with $l + |m| = 3$

(A) 8 (B) 12 (C) 10 (D) 2

Q.52 If the electronic configuration of oxygen is written as  it would violate :

1s 2s 2p

(A) Hund's rule (B) Pauli's exclusion principle

(C) Both Hund and Pauli's principles (D) Aufbau principle

Q.53 A given orbital is labelled by m = –1. This can not be :

(A) s-orbital (B) p-orbital (C) d-orbital (D) f-orbital

Q.54 The set of quantum numbers not applicable for an electron in an atom is :

(A) n = 1, l =1, m = 1, s = $+\frac{1}{2}$ (B) n = 1, l = 0, m = 0, s = $+\frac{1}{2}$

(C) n = 1, l = 0, m = 0, s = $-\frac{1}{2}$ (D) n = 2, l = 0, m = 0, s = $+\frac{1}{2}$

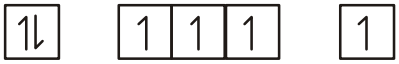
Q.55 Maximum number of electrons in a subshell is :

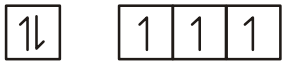
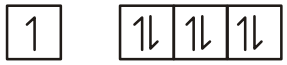
(A) $(2l + 1)^2$ (B) $2^2 (2l + 1)$ (C) $2(2l + 1)$ (D) $(2l + 1)$

Q.56 Magnetic moments of V, Cr and Mn are x, y and z respectively. Hence:

(A) x = y = z (B) x < y < z (C) x < z < y (D) z < y < x

Q.57 In which of the following Aufbau's rule is followed?

(A)  (B) 

(C)  (D) 

Q.58 In a multi-electron atom, which of the following orbitals described by the three quantum number will have the same energy in the absence of magnetic and electric fields?

(I) n =1, l = 0, m = 0 (II) n =2, l = 0, m = 0

(III) n =2, l = 1, m = 1 (IV) n =3, l = 2, m = 0

(V) n =3, l = 2, m = 1

(A) I and II (B) II and III (C) III and IV (D) IV and V

Q.59 Which of the following sets of quantum numbers represents the highest energy of an orbital in an atom?

(A) n = 3, l =0, m = 0, s = $+\frac{1}{2}$ (B) n = 3, l =1, m = 1, s = $+\frac{1}{2}$

(C) n = 3, l =2, m = 1, s = $+\frac{1}{2}$ (D) n = 4, l =0, m = 0, s = $+\frac{1}{2}$

Q.60 The electron identified by quantum numbers n and l:

(I) n = 4, l =1 (II) n = 4, l =0 (III) n = 3, l =2 (IV) n = 3, l =1

can be placed in order of increasing energy as:

(A) III < IV < II < I (B) IV < II < III < I (C) II < IV < I < III (D) I < III < II < IV

Q.61 Select the correct order of energy level in H-atom:

(A) 1s < 2s < 2p < 3s < 3p < 4s < 3d (B) 1s < 2s = 2p < 3s = 3p = 3d < 4s

(C) 1s < 2s = 3s = 4s (D) 1s < 2s = 2p < 3s = 3p < 3d < 4s

Q.62 As per the theory which of the following sub-shell is not possible -

(A) 3d (B) 4f (C) 5h (D) 6g

Q.63 Minimum number of electrons in Mn(25) atom having |m| = 1 and s = $+\frac{1}{2}$ is -

(A) 3 (B) 4 (C) 5 (D) 6

EXERCISE-2

[MULTIPLE CORRECT CHOICE TYPE]

Q.1 Which of the following statements are true regarding variation of Z_{eff} on valence shell electron for elements in the periodic table as per Slater's Rule.

(A) On moving along the period from left to right Z_{eff} increases by 0.65 in s and p-block.

(B) On moving along the period from left to right in inner transition elements, Z_{eff} remains constant.

(C) On moving along the period, from left to right in 3d series Z_{eff} increases by 0.15 without any exception.

(D) Order of sheilding power of electron corresponds to ns > np > nd > nf.

Q.2 Which of the following options have elements / ions with same value of spin multiplicity.

(A) Cr, Mn^{+1} (B) Ni^{+2} , Ti, C

(C) F, Sc, K, Rb (D) N, P, V

Q.3 For $_{24}Cr$ which of the following statements is/are correct.

(A) Number of electrons with principle quantum number '3' are 13

(B) Number of electrons with azimuthal quantum number '1' are 12

(C) Number of electrons with magnetic quantum number '0' are 12

(D) Number of minimum or maximum electrons with same spin quantum number are '9' or 15 respectively.

Q.4 Which of following statements is/are incorrect?

(A) Lanthanum is the first element of lanthanides

(B) Actinium violates the Aufbau's principle.

(C) Chromium violates the Pauli's exclusion principle.

(D) Total 10 exchanges are possible for d electrons in Zn.

Q.5 The electronic configuration of an element is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$. This represents its:

(A) Excited state of an element

(B) Ground state of atom

(C) Cationic form of an element

(D) More stable electronic configuration as compared to [Ar] $3d^9\ 4s^2$

Q.6 Which of the following energy level can not exist according to quantum theory?

(A) 3f (B) 5g (C) 5h (D) 6h

Q.7 Which of the following statement(s) is/are **correct**?

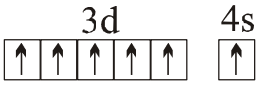
(A) For a **H-atom**, the energies of electron in 2s and 2p-subshells is same.

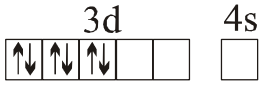
(B) The **maximum number** of electrons possible in the penultimate shell is 18.

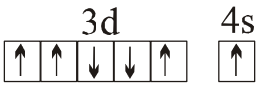
(C) **A d-orbital** can have a maximum of two electrons, with opposite spin.

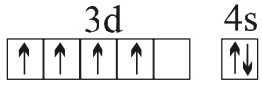
(D) In the ground state of sodium atom, there are **six electrons** in one spin and another **five electrons**, in opposite spin.

Q.8 Which of the following configuration violates Hund's Rule?

(A) 

(B) 

(C) 

(D) 

Q.9 Which of the following statement(s) is/are true for the ground state electronic configuration of potassium(K)?

(A) The 19^{th} electron enters in the 4s-subshell.

(B) There is only one unpaired electron.'

(C) Their is a maximum of 10 electrons in the parallel spin.

(D) It is an exception of configuration.

Q.10 Select the pair which follows energy order according to $(n + l)$ rule (Aufbau's principle).

(A) 4f < 6s (B) 5d > 5p (C) 3d < 4d (D) 4s < 3s

Q.11 Which of the following sub-shells does not exist for an atom, according to quantum theory?

(A) 2d (B) 4f (C) 5h (D) 7h

Q.12 Which of the following having same value of magnetic moment?

(A) Mn^{2+} & Na^{+} (B) Co^{3+} & Fe^{2+} (C) Fe^{3+} & Mn^{2+} (D) Zn^{2+} & Na^{+}

Q.13 Which of the following having same value of magnetic moment?

(A) Mn^{2+} & Na^{+} (B) Co^{3+} & Fe^{2+} (C) Zn^{2+} & Cl (D) Zn^{2+} & Na^{+}

Q.14 Number of electrons present in d-subshell and valence shell in $Cr_{(24)}$ are :

(A) $3d^5$ (B) $4s^1$ (C) $4d^4$ (D) $5s^2$

Q.15 In which of the following pairs, the ions are iso-electronic?

(A) Na^{+}, F^{-} (B) Al^{3+}, O^{-} (C) Na^{+}, Ne (D) N^{3-}, Cl^{-}

Q.16 The number of d- electrons in Fe^{3+} is equal to that of :

(A) p-electrons in N (B) total s-electron in Na

(C) d-electrons in Co^{+3} (D) total p-electrons in O^{-}

Q.17 Read the following statements and identify **correct** statements:

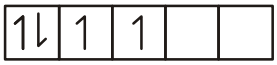
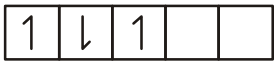
(A) An orbital is defined as that zone in space where electron is most likely to be found.

(B) According to Hund's No two electrons in an atom can have same values of all the four quantum numbers.

(C) According to 'AUFBAU' the electrons are added progressively to the various orbitals in the order of increasing energies starting with the orbital of the lowest energies.

(D) Two or more atoms of different elements which show a constant difference in A–Z in their respective Nuclei are known as isotones.

Q.18 Which of the following configuration is / are **incorrect** according to Hund's rule?

(A)  (B) 

(C)  (D) 

Q.19 Select the **correct** statement(s):

(A) In H-atom, energy of orbital can be determined by $(n + l)$ rule.

(B) If magnetic quantum number for an electron is 1 then it must be in p-orbital.

(C) A p-orbital can accommodate maximum 6 electrons.

(D) In   orbital diagram Aufbau principle is violated.

Q.20 Select the **incorrect** statement(s):

(A) Particles of liquid are arranged in a regular pattern

(B) Matter is always classified as solid, liquid and gas

(C) A pure substance must be an element

(D) Smallest particle of an element is always an atom.

Q.21 Select the **correct** order of energy level in H-atom:

(A) $1s < 2s < 2p < 3s < 3p < 4s < 3d$

(B) $1s < 2s = 2p < 3s = 3p = 3d < 4s$

(C) $1s < 2s < 3s < 4s$

(D) $1s < 2s = 2p < 3s = 3p < 3d < 4s$

Q.22 Which of the following information(s) is / are **incorrect** for Fe^{+2} (Z = 26) :

(A) Electronic configuration is $[_{18}Ar]\ 3d^4\ 4s^2$

(B) Number of unpaired electrons are 4

(C) Maximum number of electrons having m = 0 are 6

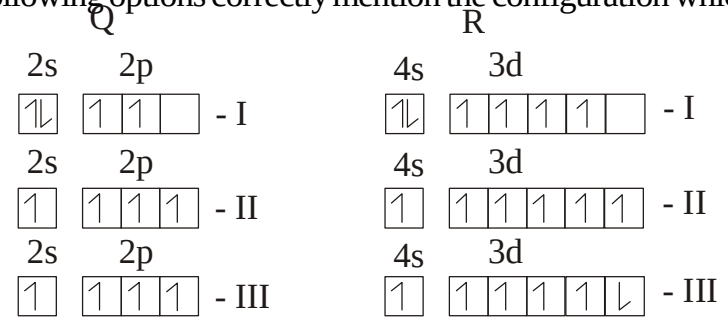
(D) Four quantum numbers of outermost electrons are n = 4; l = 0 ; m = 0; s = $+\frac{1}{2}$

[PARAGRAPH TYPE]

Paragraph for question nos. 23 to 25

Electronic configuration of elements give an idea about various properties of elements and hence it is one of the basis for periodic classification of elements. An element prefers to stay in that configuration in which its energy is least. A substance is said to show "Paramagnetic properties" if it has unpaired electrons.

Q.23 Which of the following options correctly mention the configuration which is most stable among Q and R.



(A) Q - I and R - I (B) Q - I and R - II

(C) Q - II and R - I (D) none of the above options

Q.24 Which of the following is expected to be paramagnetic :

(A) Fe (B) Zn (C) Ne (D) Be

Q.25 Specie having configuration same as ns^2np^4 where 'n' represents last shell is/are :

(A) $_{16}O^{32}$ (B) $_{34}Se^{79}$ (C) $_{9}F^{19}$ (D) Both $_{16}O^{32}$ and $_{34}Se^{79}$

Paragraph for question nos. 26 & 27

When an atom in ground state is subjected to energy radiations, it gets excited to higher energy level. Depending upon the energy provided, different excited state can be obtained. If S-I represents ground state of He, S-II represents $1s^1\ 2s^1$ and S-III represents $1s^1\ 2p^1$, then

Q.26 In which of the state both the electrons will be **closest to the nucleus.**

(A) S-I (B) S-II (C) S-III (D) All are at same distance

Q.27 Which of the state will have **maximum energy.**

(A) S-I (B) S-II (C) S-III (D) All have same

Paragraph for question nos. 28 to 30

Information-1 : Principal quantum number **'n'** is defined as 1,2,3,.....

Information-2 : Azimuthal quantum number **'*l*'** is defined as 1 to (n + 2) in integral steps of 1

Information-3 : Magnetic quantum number **'m'** is defined as $-l/2$ to $+l/2$ (including zero, if any) in integral steps.

Information-4 : Spin quantum number **'s'** has five possible values $(-2,-1,0,+1,+2)$

Information-5 : The sub-shell corresponding to l = 1,2,3,4,5....designated as A,B,C,D,E,F... respectively.

Information-6 : The values of m for a given value of l give the number of orbitals in a sub-shell.

Information-7 : The principles for filling electrons in the shells remain unchanged.

On the basis of above informations, answer the following questions.

Q.28 The second period would begin with–

(A) Gallium (B) Iron (C) Cesium (D) Arsenic

Q.29 For the element having atomic number 62, last electron enters in

(A) 1C (B) 2A (C) 3A (D) 2B

Q.30 The number of orbitals & the maximum number of electrons that can be filled in a F sub-shell are respectively.

(A) 6, 36 (B) 7, 35 (C) 7, 42 (D) 6,30

Paragraph for question nos. 31 to 33

Imagine a universe in which the four quantum number can have the following values.

n = 1 to ∞

l = 0 to n

m = $-(l+1)$ to $+(l+1)$ including zero

s = $+\frac{1}{2}$ and $-\frac{1}{2}$

Answer the following questions based on the above values.

Q.31 Total number of elements in the III period of periodic table is

(A) 8 (B) 20 (C) 30 (D) 15

Q.32 If AUFBAU (n + l) rule is valid then block of $_{30}$Zn is

(A) s-block (B) p-block (C) d-block (D) f-block

Q.33 Spin only magnetic moment (μ) of the element sulphur ($_{16}S$) is

(A) $\sqrt{3}$ B.M. (B) 0 B.M. (C) $\sqrt{8}$ B.M. (D) $\sqrt{15}$ B.M.

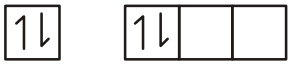
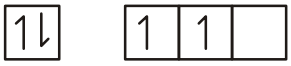
Paragraph for question nos. 34 to 36

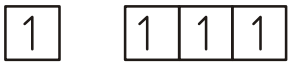
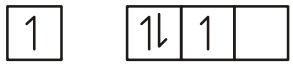
Arrangement of electrons into the orbitals of different atoms take place according to the Aufbau principle which is based on the Pauli's exclusion principle, the Hund's rule of maximum multiplicity and the relative energies of the orbitals.

As per Aufbau principle, in the ground state of atom, orbitals are filled in order of their increasing energies and according to Pauli, No two electrons in an atom can have same values of all four quantum numbers.

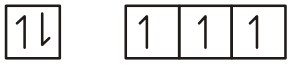
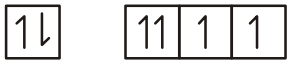
While Hund's rule deals with filling of electrons in degenerate atomic orbitals of a subshell.

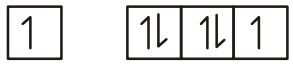
Q.34 The orbital diagram in which both Hund's rule and Aufbau principle are violated :

(A)  (B) 

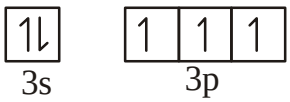
(C)  (D) 

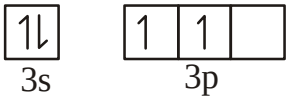
Q.35 Which of the following electronic configuration violates Pauli's exclusion principle?

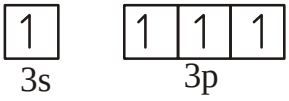
(A)  (B) 

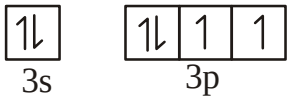
(C)  (D) 

Q.36 For the following four electronic configuration (remaining inner orbitals are completely filled) select the **correct** option ?

(i) 

(ii) 

(iii) 

(iv) 

(A) (iii) violates all three rules of electronic configuration.

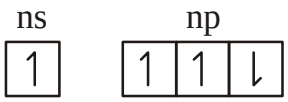
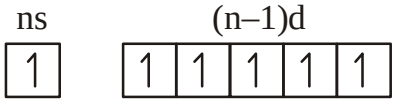
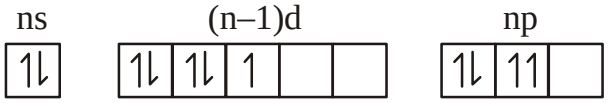
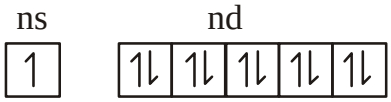
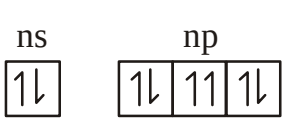
(B) order of spin multiplicity (iii) > (i) > (ii) > (iv)

(C) stability order (iii) > (i) > (ii)

(D) above all are incorrect

[MATCH THE COLUMN]

Q.37 **Instructions** : Column I represents some characteristics associated with electronic configuration and column II represents partial electronic configurations. Match them appropriately.

	Column I		**Column II**
(A)	Violation of Pauli's Exclusion	(P)	
(B)	Violation of Hund's rule	(Q)	
(C)	Violation of Aufbau's principle	(R)	
(D)	Result of extra stability of half filled configuration hence correct configuration	(S)	
		(T)	

Q.38

Column-I		**Column-II**	
(A)	Zero unpaired electron	(P)	Na^+, Mg^{2+}, F^-
(B)	Same number of electron in s & p subshells.	(Q)	F^-, Mg, O^{2-}
(C)	Same number of electrons with the $l = 1$	(R)	Mg, Ne, O^{2-}
(D)	Isoelectronic species	(S)	Na^+, Ne, F^-
		(T)	Cl^-, Ca, S^{--}

Q.39

	Column I	Column II
(A)	Violation of AUFBAU principle	(P) Ca
(B)	Possible species which has 12 electrons for $l = 1$	(Q) Cr
(C)	Maximum possible species which has same $(n + l)$ value for last electron	(R) Mn
(D)	Maximum possible species which can have even number of electrons for $m = -1$	(S) Co
		(T) Ag

Q.40

Column-I		Column-II	
(A)	4s	(P)	$n = 4, l = 3, m = 0$
(B)	2p	(Q)	$n = 2, l = 1, m = 1$
(C)	3d	(R)	$n = 3, l = 2, m = -1$
(D)	4f	(S)	$n = 4, l = 0, m = 0$
		(T)	$n = 4, l = 3, m = -3$

[INTEGER TYPE]

Q.41 Calculate 'Q' for last electron of Ga.
where $Q = n + l +$ maximum possible value of 'm'.

Q.42 If one orbital occupied 3 electron than calculate the number of element in a 10^{th} period of the periodic table?
[If your answer is 79 so write 0079]

Q.43 Find the number of electrons having the value of azimuthal quantum number 'l' = 1 for Cd^{2+}.

Q.44 If for any electron in an orbital another parameter 'B' is defined as
$B = n + l + m$, where n, l, m are the quantum numbers of that orbital then what will be the maximum value of B for the last electron of $_{35}Br$.

Q.45 In case of nitrogen, if M_1 represents spin multiplicity if Hund's rule is followed and M_2 represents spin multiplicity if only Hund's Rule is violated then the value of $\frac{M_1}{M_2}$ will be :

Q.46 Calculate total number of orbitals having **(n + ℓ) value = 8** and **magnetic quantum number a non-zero** quantity.

Q.47 According to Aufbau's Principle, the maximum number of electron that can be accomodated in the outermost orbit (ab) and the penultimate orbit (cd) is :
[Fill the OMR as abcd. For example, if these numbers are ab = 02 and cd = 08, then fill OMR as 0208]

Q.48 What is the **maximum** number of electrons possible in Ni^{+} having **same spin**.

Q.49 How many orbitals, contain **at least one** electron in the ground state electronic configuration of Chromium atom?

Q.50 An electron has the quantum numbers n = 3 and m = 2. For this electron, the value of '*l*' should be
[If the only possible *'l'* value is x, then fill OMR as 000x and if the possible *'l'* values are x,y and z, then fill OMR as 0xyz, where x, y and z are in the increasing order]

Q.51 Maximum number of electrons in parallel spin in the ground state of Chromium atom is :

Q.52 If the magnetic quantum number for an electron is –3, the minimum value for its principal quantum number is :

Q.53 The mass number of an element 'X' is 'A'. If X^{4-} contains 10 electrons and 6 neutrons, then the value of $\frac{A}{3}$ is

Q.54 Calculate the total number of p-orbitals electrons present in Cu (29) atom.
(If your answer is 12 so write is 0012)

Q.55 Find the total number of elements present in 5th period?
(If your answer is 12 so write is 0012)

Q.56 Calculate the total number of electron for Fe having n + *l* + m = 2.
(If your answer is 5 so write is 0005)

Q.57 Find the total number of paramagnetic species among the following?
Sc^{3+}, Fe^{3+} , Mn^{2+}, Co^{4+}, Co^{3+}, Cr^{+}, Fe^{2+}, Mn^{3+}, Cr^{3+}, Zn^{2+}, Ti^{+4}, V^{3+}, Na^{+}, Mg^{2+}, Ca^{2+}
(If your answer is 15 so write is 0015)

Q.58 Calculate the total number of p-orbitals electrons present in Ag (47) atom.
(If your answer is 12 so write is 0012)

Q.59 Find maximum number of electrons in $_{13}Al$ in which $\frac{l \times m}{n} = 0$.

Q.60 How many total number of orbitals are present in $_{30}Zn$ which has m (magnetic quantum number) = 0 ?

Q.61 Calculate maximum multiplicity value for 'd' electron of Co^{+x} ion if it has magnetic moment value $\sqrt{24}$ B.M.

Q.62 Magnetic moment of an ion of Mn^{+x} is 3.873 B.M. If number of unpaired electron is '**y**' in this ion the value of **(x + y)**:

Q.63 Maximum possible number of electrons in an atom having following quantum numbers n = 4 ; $|m_l| = 1$; $s = +\frac{1}{2}$.

Q.64 Maximum number of possible exchanges in d^7 configuration:
[Subtract your answer by 5]

Q.65 If Hund's rule is violated and all other rules stands true then find number of among followings which are having number of unpaired electrons greater than those present in Fe^{2+}.

Cr^{+3}, Mn^{+2}, Cu^{+1}, Zn^{+1}, Co^{+1}, Sc^{3+}, Ni^{2+}

[ANSWER KEY]

EXERCISE-1

Q.1	D	Q.2	D	Q.3	D	Q.4	A	Q.5	C
Q.6	D	Q.7	D	Q.8	D	Q.9	C	Q.10	B
Q.11	D	Q.12	B	Q.13	A	Q.14	C	Q.15	A
Q.16	C	Q.17	B	Q.18	A	Q.19	C	Q.20	C
Q.21	C	Q.22	C	Q.23	C	Q.24	A	Q.25	D
Q.26	D	Q.27	D	Q.28	C	Q.29	C	Q.30	D
Q.31	D	Q.32	A	Q.33	B	Q.34	B	Q.35	D
Q.36	C	Q.37	C	Q.38	C	Q.39	C	Q.40	B
Q.41	C	Q.42	A	Q.43	C	Q.44	D	Q.45	B
Q.46	D	Q.47	C	Q.48	D	Q.49	D	Q.50	D
Q.51	D	Q.52	A	Q.53	A	Q.54	A	Q.55	C
Q.56	C	Q.57	C	Q.58	D	Q.59	C	Q.60	B
Q.61	B	Q.62	C	Q.63	B				

EXERCISE-2

Q.1	AB	Q.2	ABCD	Q.3	ABCD	Q.4	ACD	Q.5	BCD
Q.6	AC	Q.7	ABCD	Q.8	BC	Q.9	ABC	Q.10	BC
Q.11	AC	Q.12	BCD	Q.13	BD	Q.14	AB	Q.15	AC
Q.16	BD	Q.17	ACD	Q.18	AB	Q.19	D	Q.20	ABC
Q.21	BC	Q.22	ACD	Q.23	B	Q.24	A	Q.25	D
Q.26	A	Q.27	C	Q.28	B	Q.29	D	Q.30	B
Q.31	C	Q.32	B	Q.33	B	Q.34	D	Q.35	B
Q.36	D								
Q.37	(A) RT (B) PRT or PR (C) PORS or PRS (D) Q								
Q.38	(A)PQRST (B) PS (C) PQRST (D) PS								
Q.39	(A) QT (B) PQRS (C) QRS (D) PST								
Q.40	(A) S; (B) Q; (C) R; (D) PT								
Q.41	0006	Q.42	0108	Q.43	0018	Q.44	0006	Q.45	0002
Q.46	0012	Q.47	0818	Q.48	0015	Q.49	0015	Q.50	0002
Q.51	0015	Q.52	0004	Q.53	0004	Q.54	0012	Q.55	0018
Q.56	0004	Q.57	0009	Q.58	0018	Q.59	0009	Q.60	0007
Q.61	0004 or 0005	Q.62	0007	Q.63	0006	Q.64	0006	Q.65	0003