Shell	Number of subshells	Subshells
K(1)	1	s
L(2)	2	s , p
M(3)	3	s , p , d
N(4)	4	s , p , d , f

Subshell	Maximum number of electrons that can be accommodated
s	2
p	6
d	10
f	14

- The subshells in the increasing order of their energies.
  1s < 2s < 2p < 3s < 3p < 4s < 3d ....

- **Block = The subshell to which the last electron is added.**

- **Period number = Serial number of the outer most shell**

Block	Group number
s	**Number of electrons in the last 's' subshell** Eg : $_{11}$Na - $1s^2\ 2s^2\ 2p^6\ 3s^1$ **Group number = 1**
p	**Number of electrons in the last 'p' subshell + 12** Eg: $_{15}$P - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$ **Group number = 12 + 3 = 15**

d	**Number of electrons in the outer most 's' subshell + number of electrons in the proceding 'd' subshell** Eg : $_{23}$ V - $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^3\ 4s^2$. **Group number = 2 + 3 = 5**

■

Block	Position
s	**Group 1 and group 2**
p	**Group 13 to 18**
d	**Group 3 to 12**

Each question from 1 to 9 carries 1 score.

1. Which one of the following subshells is not possible in an atom ?
   (1s, 2p, 5s, 2d)
2. What is the maximum number of electrons that can be accommodated in d subshell?
3. Which shell has only one subshell?
4. Which subshell among the following has the highest energy?
   (2p,4s,3d,3p)
5. How many subshells are present in M shell?
6. In which block does the transition elements belong?
7. Subshell electronic configuration of an atom is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$. How many shells are present in this atom?
8. What is the oxidation state of Mn in Mn_2O_3.
   (Hint: oxidation state of Oxygen is (-2))
   [+4, +3, +2, +1]
9. Choose the wrong subshell electronic configuration from those given below.
   ($1s^2\ 2s^1$, $1s^2\ 2s^2\ 2p^4$, $1s^2\ 2s^2$, $1s^2\ 2s^2\ 2p^7$)

Each question from 10 to 14 carries 2 scores.

10. Subshell electronic configuration of an element is [Ar] $4s^1$.
    a) Write the complete subshell electronic configuration of this element.
    b) What is the atomic number of the element.
11. a) Find the oxidation state of Fe in $FeCl_2$.
    [Hint: Atomic number of Fe = 26, Oxidation state of Cl = -1]
    b) Write down the subshell electronic configuration of Fe^{3+}.

12. Find out the correct statements related to d block elements among the given statements below.
    a) Shows variable oxidation state.
    b) They are non - metals.
    c) They produce coloured compounds.
    d) They show high electronegativity.
13. Subshell electronic configuration of some elements are given below.
    (Symbols are not real)

    P- $1s^2\ 2s^2\ 2p^3$
    Q- $[Ar]\ 3d^3\ 4s^2$
    R- $1s^2\ 2s^2\ 2p^6$
    S- $1s^2\ 2s^2\ 2p^6\ 3s^1$

    a) Which element among these can form coloured compounds?
    b) Which are the elements belong to the same group?
14. Subshell electronic configuration of an element is $[Ar]\ 3d^5\ 4s^1$.
    a) What is the atomic number of the element ?
    b) Which is the subshell to which the last electron is added?

Each question from 15 to 17 carries 3 scores.

15. The element X has 1 electron in the s subshell in 3rd shell.
    a) write the complete subshell electronic configuration of X.
    b) Find out the atomic number of this element.
    c) To which block does the element X belong?
16. a) Find out the oxidation state of Mn in the following compounds.
    i) $MnCl_2$ ii) MnO_2
    [Hint :Oxidation state Cl = (-1) , O =(-2)]
    b) Give reason for the variable oxidation state of d block elements.
17. The atomic number of an element is 19.
    a) Write the subshell electronic configuration of this element.
    b) Find out the period number and group number of the element.

Each question from 18 to 20 carries 4 scores.

18. a) Select the correct subshell electronic configuration of $_{24}Cr$ from the following:
    i) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^4\ 4s^2$
    ii) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^1$
    b) Write the reason for selecting this configuration.
    c) Find out the period number and group number of the element.
19. Analyse the table and answer the questions. (The symbols are not real)

Element	Period number	Group number
X	3	17
Y	2	2

    a) Write the subshell electronic concentration of element Xand Y
    b) To which block of the periodic table does the element Y belong?
    c) How many p electrons are in the element X.

20. Subshell electronic configuration of some elements are given below.
(Symbols are not real)

X - [Ne] $3s^2$

Y - [Ar] $4s^2$

Z - [Ar] $3d^3\ 4s^2$

a) Write the complete subshell electronic configuration of element Y.

b) Which of them shows variable oxidation state?

c) Find the group number and period number of element Z.

1 Periodic Table and Electronic Configuration

Qn. No	Answer Key / Value points	Score	Total Score
1.	2d	1	1
2.	10	1	1
3.	K	1	1
4.	3d	1	1
5.	3 (s , p, d)	1	1
6.	d	1	1
7.	3	1	1
8.	+3	1	1
9.	$1s^2\ 2s^2\ 2p^7$	1	1
10.	a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$ b) 19	1 1	2
11.	a)+2 b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5$ / [Ar] $3d^5$	1 1	2
12.	a) & c)	1+1	2
13.	a)Q b) P & R	1 1	2
14.	a) 24 b) d	1 1	2
15.	a) $1s^2\ 2s^2\ 2p^6\ 3s^1$ b)11 c)s block	1 1 1	3
16.	a) i) +2 ii) +4 b) In d block elements, the energy between the outermost s subshell and the penultimate d subshell is very small. Hence under suitable conditions the electrons in d subshell also take part in chemical reactions. Hence transition elements show variable oxidation states.	1+1 1	3

17.	a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$ b) Period number =4 , Group number = 1	1 1+1	3
18.	a) ii) b) The half filled or fully filled d subshell elecronic configuration is more stable than other atoms c) Group number = 6 , Period number = 4	1 1 1+1	4
19.	a) X - $1s^2\ 2s^2\ 2p^6 3s^2\ 3p^5$ Y - $1s^2\ 2s^2$ b) s block c)11	1+1 1 1	4
20.	a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$ b) Z c) Group number = 5 , Period number = 4	1 1 1+1	4