LEVEL 1

1. (A) (D)
   Neutrons are not discovered by 'canal rays ' experiment . the cathode ray tube experiment was only for discovery of electrons
2. (D)
   Neutrons were not discovered by that time.
3. (B)
   Fact
4. (A)
   Total number of orbitals in a subshell is given by (2l+1)
5. (A)
   Second shell has only s and p subshell
6. (C)
   Statement of Pauli's exclusion principle
7. (A)
   Zn $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$
   Zn^{+2} $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$
8. (D)
   Cr [Ar] $3d^5 4s^1$
   Cr^{+1}[Ar]$3d^5$
9. (A)
   Atomic number of beryllium is 4
10. (D)
    Definition of diamagnetic substance

LEVEL 2

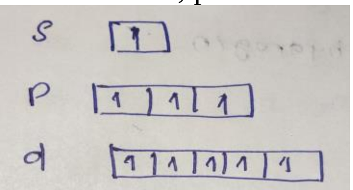
1. (D)
   α-particles were used which are helium nuclei
2. (A)
   Experiment leads to discovery of nucleus
3. (B)
   Radius of nucleus=10^{-13}cm
4. (A)
   Principle quantum number deals with size
5. (C)
   For l=2, m= -2, -1, 0, +1, +2
6. (A)
   +1/2 →clockwise rotation
   -1/2 → anticlockwise rotation
7. (C)
   Two electron in an atom can not here all four quantum numbers same
8. (A)
   Z=37 belongs to s-block element so
   l=0 n=5 (5th period)

LEVEL 3

1. (D)
   $E_{total} = E_1 + E_2$
   $\therefore (hc)/\lambda = (hc)/\lambda_1 + (hc)/\lambda_2$
   $\therefore 1/\lambda = 1/\lambda_1 + 1/\lambda_2$
   $\therefore 1/355 = 1/680 + 1/\lambda_2$
   $\therefore 1/\lambda_2 = 1/355 - 1/680$
   $= (680 - 355)/(355\times680)$
   $\therefore \lambda = 743nm$
2. (C)
   $E_n = -13.6\ z^2/n^2$ ev
   $= -13.6 \times (3)^2/(2)^2$
   $= -30.6$ ev
3. (D)
   Energy required to break one mole of Cl-Cl bonds=242 KJ
   =242000 J
   ∴Energy required to break a single Cl-Cl bond=$(242000)/(6.023\times10^{23})$
   $=40179\times10^{-23}$J
   $E=(hc)/\lambda$
   $40179\times10^{-23} = (6.63\times x10^{-34}\times3\times10^{8})/\lambda$
   $\therefore\lambda = (6.63\times10^{-34}\times3\times10^{8})/(40179\times10^{-23})$ m
   $=(19.89\times10^{-26})(/40179\times10^{-23})=(19890\times10^{-29+23})/40179$
   $=0.495\times10^{-6}$m
   $=0.495\times10^{-6}\times10^{9}$nm
   =495nm
4. (B)
   $E\propto z^2/n^2$
   $\therefore E_{He+} = -19.6\times10^{-18}$ J/atom
   $E_{Li+2} = ?$
   $(E_{He+})/(E_{Li+2}) = (2^2/1^{2)})/(3^2/2^2)$
   $(-19.6\times10^{-18})/E_{Li+2} = 4/9$
   $\therefore E_{Li+2} = -19.6\times10^{-18}\times9/4$
   $= -4.41\times10^{-17}$ J/atom
5. (A)
   T.E = -K.E
6. (C)
   $I.E\propto z^2/n^2$
   $\therefore I.E_{He}/I.E_H = (2^2/1^2)/(1^2/1^2)$
   $\therefore I.E_{He}=13.6\times4$ev
   =54.4ev
7. (B)
   $\lambda= h/mv$
   $=(6.63\times10^{-34})/(1.67\times10^{-27}\times1\times10^{3})$
   $=4\times10^{-34+27-3}$
   $=4\times10^{-10}$m
   =0.4nm
8. (D)
   $E_1= 1.312 \times 10^6$ J/mol
   $E_2 = 1.312 \times 10^6\ z^2 / n^2 = 1.312 \times 10^6 \times 1^2 / 4$
   $= 0.328 \times 10^6$ J/mol
   $E_1 - E_2 = (1.312 - 0.328) \times 10^6 = 9.84 \times 10^5$ J/mol

9. (B)
$\lambda = h/mv = (6.63 \times 10^{-34})/(10 \times 10^{-6} \times 100) = 6.63 \times 10^{-31}$ m
10. (B)
$\Delta v = (0.005/100) \times 600 = 0.03$
$\Delta x . m\Delta v = h/4\pi$
$\Delta x \times 9.1 \times 10^{-31} \times 0.03 = (6.63 \times 10^{-34})/(4 \times 3.14)$
$\Delta x = 1.92 \times 10^{-3}$ m
11. (C)
$\Delta v = (0.001/100) * 300 = 0.003$
$\Delta x . m\Delta v = h/4\pi$
$\Delta x \times 9.1 \times 10^{-31} \times 0.003 = (6.63 \times 10^{-34})/(4 \times 3.14)$
$\Delta x = 1.92 \times 10^{-2}$ m
12. (C)
γ rays have highest and alpha particles have lowest penetrating power.
13. (C)
$\lambda = h/mv = (6.63 \times 10^{-34})/(6.62 * 10^{-29} * 10^{-3} * 10^{3}) = 10^{-5}$ m
14. (B)
Radius for bohr orbit of hydrogen atom = 0.529 Å
For n=2 Be^{+3}
r= $0.529 * 2^2/4 = 0.529$Å
15. (B)
Frequency = 1/ time period
$= 1/(5 * 10^{-3}) = 2 * 10^2\ s^{-1}$
16. (A)
$1/\lambda \propto Z^2$
Li has highest atomic number among all hence it will have lowest wavelength.

17. (B)
$1/\lambda = R(1/n_1^2 - 1/n_2^2)$
$= R(1/1^2 - 1/3^2)$
$= R\ 8/9$
18. (B)
Mg^{2+} has 10 electron similar to Na^+
19. (A)
All have 18 electrons
20. (C)
For He^+
$1/\lambda = Z^2R(1/n_1^2 - 1/n_2^2)$
$= 4R(1/4 - 1/16)$
$= R\ 3/4$
For H
$1/\lambda = 1R(1/1 - 1/4)$
$= R\ 3/4$
21. (C)
For n= 3
Subshell are s, p and d



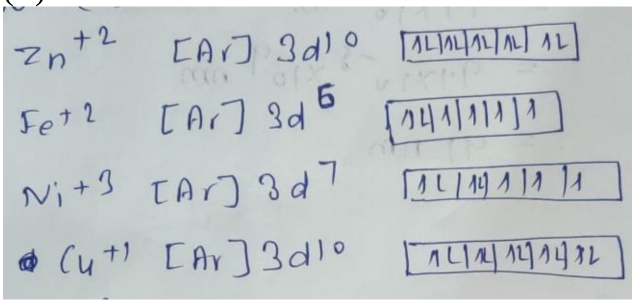
22. (D)
Cu (29) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$
For outermost electron $4s^1$
n= 4
l=0
m=0
s=+½
23. (B)
Follow (n+ l) rule
24. (B)
For l=2
m= -2 , -1, 0, +1, +2
25. (D)
Apply (n+l) rule
26. (C)
Isotones have same number of neutrons.
Number of neutrons = A-Z
27. (D)
Radius of first bohr orbit of hydrogen atom is 0.529Å
28. (C)
Apply (n+l) rule
29. (D)
Refer solution of question no. 20
30. (C)
Single orbital can accommodate 2 electrons
31. (B)
Decreases
32. (D)
For fourth line of balmer series
$n_1= 2$
$n_2= 6$
$1/\lambda= R(1/n_1^2 - 1/n_2^2)$
$= 109677 (¼ - 1/36)$
$= 24372\ cm^{-1}$
33. (A)
For K $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ M shell electron = 8
For Mn $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^2$ M shell electron = 13
For Ni $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$ M shell electron= 16
For Sc $1s^2 2s^2 2p^6 3s^2 3p^6 3d^1 4s^2$ M shell electron = 9
34. (A)
$1/\lambda= R(1/n_1^2 - 1/n_2^2)$
$= 1.097 * 10^7 (1/1^2 - 1/\infty^2)$
$= 1.097 * 10^7$
$\lambda= 1/(1.097 * 10^7)$
= 91 nm
35. (C)
For n= 4
l= 0, 1, 2, 3
36. (D)
Apply (n + l) rule

37. (A)
$\lambda = h/mv = (6.63 * 10^{-34})/(60 * 10^{-3} * 10)$
$= 10^{-33}$ m

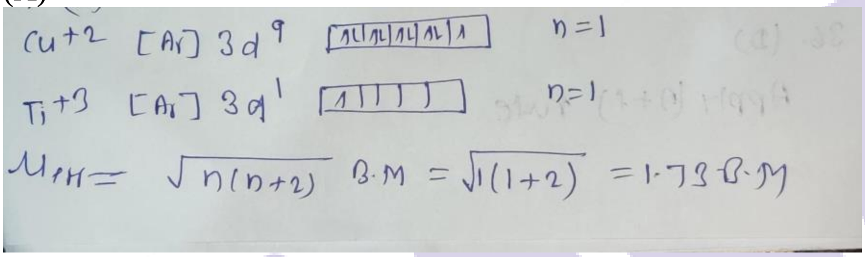
38. (B)
Cr (Z=24) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1\ 3d^5$
(l=1) (l=1) (l=2)

39. (D)
Statement of Heisenberg uncertainty principle.

40. (B)



41. (A)



SUBJECTIVE QUESTIONS

1. a) 4d
   b) 5p
2. a) 5d , 5 orbitals
   b) 1s , 1 orbital
   c) 6f , 7 orbitals
   d) 2p , 3 orbitals
3. a) 2p 6 electrons
   b) 4d 2 electrons
   c) $2n^2$ electrons = $2 * 2^2$ = 8 electrons
   d) 3d 2 electrons
4. Second shell has s and p subshell according to quantum number hence no d orbital
5. s 1orbital
   p 3 orbital
   d 5 orbital