ATOMIC STRUCTURE

Cathode rays, Anode rays, Basic definations and Rutherford model'

1 Cathode ray are :

(1) stream of electrons (2) stream of α-particles

(3) radiation (4) stream of cations

2 Which of the following rays are affected by electric field :

(1) Anode rays (2) Cathode rays (3) Both (1) and (2) (4) None of these

3 The e/m ratio for Anode rays :

(1) varies with the element forming the anode in the discharge tube.

(2) varies with the gas filled in the discharge tube.

(3) is constant.

(4) Both (1) & (2).

4. Millikan's oil drop expriments is used to find -

(1) e/m ratio of an electron (2) Charge of an electron

(3) Mass of an electron (4) Velocity of an electron

5. An element having atomic number 25 and atomic weight 55 will have –

(1) 25 protons and 30 neutrons (2) 25 neutrons and 30 protons

(3) 55 protons (4) 55 neutrons

6. The charge on the atom having 17 protons, 18 neutrons and 18 electrons is

(1) + 1 (2) – 1 (3) – 2 (4) zero

7. Which of the following are isoelectronic with one another ?

(1) Na^+ and Ne (2) K^+ and O (3) Ne and O (4) Na^+ and K^+

8. When atoms are bombarded with alpha particles, only a few in million suffer deflection, others pass out undeflected. This is because

(1) The force of repulsion on the moving alpha particle is small

(2) The force of attraction on the alpha particle to the oppositely charged electrons is very small

(3) There is only one nucleus and large number of electrons

(4) The nucleus occupies much smaller volume compared to the volume of the atom

9. Which of the following elements has maximum density of nucleus :

(1) ${}_{14}Si^{30}$ (2) ${}_{15}P^{31}$ (3) ${}_{8}O^{16}$ (4) All have same density

10. Number of protons, neutrons and electrons in the element ${}^{281}_{89}Ac$ are respectively :

(1) 89, 231, 89 (2) 89, 89, 242 (3) 89, 142, 89 (4) 89, 192, 89

Nature of Light and photoelectric effects

11 . A photon in X region is more energetic than in the visible region ; X is :

(1) Infrared (IR) (2) Ultraviolet (UV) (3) Microwave (4) Radio wave

12 Which one of the following is not the characteristic of Planck's quantum theory of radiation-

(1) The energy is not absorbed or emitted in whole number multiple of quantum.

(2) Radiation is associated with energy.

(3) Radiation energy is not emitted or absorbed continously but in the form of small packets called quanta.

(4) This magnitude of energy associated with a quantum is proportional to the frequency.

13 One quantum is absorbed per gaseous molecule of X_2 for converting it into X atoms. If light absorbed has wave length 1240Å, then bond energy of X_2 will be :

(1) 10 eV/molecule (2) 20 J/mole (3) 48 eV/molecule (4) 184 J/mol

14 The work function for a metal is 4 eV. To eject a photoelectron of zero velocity from the surface of the metal, the wavelength of incident light should be above :

(1) 310 Å (2) 1550 Å (3) 155 Å (4) 3100 Å

15 Cu metal (work function = 4.8 eV) can show photoelectric effect if wavelength of photon is :

(1) λ = 5000 Å (2) λ = 6000 Å (3) λ = 2000 Å (4) λ = 4000 Å

16 Calculate frequency of light having wavelength 500 nm is

(1) 6×10^{14} Hz (2) 5×10^{10} Hz (3) 2×10^{20} Hz (4) 7×10^{10} Hz

17. The energy of a photon is 3.03×10^{-19} J, then wavelength of this photon is:

(Given, $h = 6.63\times10^{-34}$ Js, $c = 3.00\times10^{8}$ ms^{-1})

(1) 6.56 nm (2) 65.6 nm (3) 656 nm (4) 0.656 nm

18 The energy required to remove an electron from a metal X is 3.31×10^{-20} J. Wavelength/s of light that can not photoeject an electron from metal X is

(1) 4 μm (2) 6 μm (3) 7 μm (4) 5 μm

19 Wavelength of a photon having an energy of 2 eV. will be :

(1) 6.2×10^{-7} m (2) 6.2×10^{-6} m (3) 6.2×10^{-9} m (4) 6.2×10^{-8} m

20 Wave number of radiations having frequency of 4×10^4 Hz will be :

(1) 1.33×10^{-6} cm^{-1} (2) 1.33×10^{-7} cm^{-1} (3) 9×10^{-11} cm^{-1} (4) 4×10^{-5} cm^{-1}

Atomic Spectrum

21 The wavelength of a spectral line for an electronic transition is inversly related to :

(1) No. of electrons undergoing transition

(2) The nuclear charge of the atom

(3) The velocity of an electron undergoing transition

(4) The difference in the energy levels involved in the transition

22 The spectral lines corresponding to the radiation emitted by an electron jumping from 6th, 5th and 4th orbits to second orbit belong to :

(1) Lyman series (2) Balmer series

(3) Paschen series (4) Pfund series

23 Which transition emits photon of maximum frequency in hydrogen like species :

(1) 2nd spectral line of Balmer series (2) 2nd spectral line of Paschen series

(3) 5th spectral line of Humphery series (4) 5th spectral line of Lymen series

24 The shortest wave length for the Brakett series for H is : (Given R_H = 109678 cm^{-1})

(1) 1459 Å (2) 4052 Å (3) 4052 nm (4) 1459 nm

25 The transition of electron in H-atom that will emit maximum energy is :

(1) $n_3 \to n_2$ (2) $n_4 \to n_3$ (3) $n_5 \to n_4$ (4) All have same energy

26 Wavelength of first line of Balmer series in hydrogen spectrum is :

(1) 6656 Å (2) 6266 Å (3) 6626 Å (4) 6566 Å

27 Different lines in Lyman series of hydrogen spectrum is present in :

(1) Ultra violet (2) Visible (3) Infared (4) None of these

28 When an electron in an excited hydrogen atom jumps 5^{th} orbit to 3^{rd} orbit the spectral line is observed in the ....region and in ....series of the hydrogen spectrum.

(1) Visible, Balmer (2) Visible, Lyman (3) Infrared, Paschen (4) Infrared, Balmer

29 Maximum number of spectral lines in Lyman series will be if electron makes transistion from n^{th} orbit :

(1) n (2) n – 1 (3) n – 2 (4) n (n + 1)

30 No. of visible lines when an electron returns from 5th orbit to ground state in H spectrum -

(1) 5 (2) 4 (3) 3 (4) 10

31 Whon the electron of a Hydrogen atom jumps from n = 4 to n = 1 state, then the total number of spectral line is

(1) 15 (2) 3 (3) 6 (4) 4

32 Ratio of wavelength of second line of Lyman series to that of series limit of Paschen series of H-atom.

(1) 1/8 (2) 1/9 (3) 8/9 (4) 9/8

33 The wave number of first line of Balmer series of hydrogen atom is 15200 cm^{-1}. What is the wave number of first line of Balmer series of Li^{2+} ion:

(1) 15200 cm^{-1} (2) 13680000 m^{-1} (3) 76000 cm^{-1} (4) 13680 cm^{-1}

Bohr's Model

34 The expression for Bohr's radius of an atom is

(1) $r = \frac{n^2h^2}{4\pi^2 me^4z^2}$ (2) $r = \frac{n^2h^2}{4\pi^2 me^2z}$ (3) $r = \frac{n^2h^2}{4\pi^2 me^2z^2}$ (4) $r = \frac{n^2h^2}{4\pi^2 m^2e^2z^2}$

35 The ratio of radii of second orbits of He^+ , Li^{2+} and Be^{3+} is **:**

(1) 1 : 2 : 3 (2) 6 : 4 : 3 (3) 3 : 4 : 6 (4) none of these

36 If r is the radius of first orbit, the radius of n^{th} orbit of H atom is given by -

(1) r n (2) $r\ n^2$ (3) r/n (4) $r^2\ n^2$

37 What is the ratio of speeds of electrons in Ist orbit of H-atom to IVth orbit of He^+ ion .

(1) 2 : 1 (2) 8 : 3 (3) 3 : 2 (4) 27 : 5

38 If the speed of electron in second orbit of He^+ is "v" , then the speed of electron in first Bohr orbit of hydrogen atom will be :

(1) v/2 (2) 2v (3) v (4) 4v

39 Which state of the triply ionized Beryllium (Be^{3+}) has the same orbit radius as that of the ground state of hydrogen atom ?

(1) 1 (2) 2 (3) 3 (4) 4

40 If the velocity of the electron in first orbit of H atom is 2.18×10^6 m/s,what is its value in third orbit ?

(1) 7.27×10^5 m/s (2) 4.36×10^6 m/s

(3) 1.24×10^5 m/s (4) 1.09×10^6 m/s

41 The radius of a shell for H-atom is 4.761 Å. The value of n is.

(1) 9 (2) 3 (3) 5 (4) 4

42 If the radius of I^{st} orbit of hydrogen atom is 0.53 Å then radius of I^{st} orbit of He^+ is :

(1) 1.27 Å (2) 0.265 Å (3) 1.59 Å (4) 0.132 Å

43 Ratio of radii of second and first Bohr orbits of H atom is :

(1) 2 (2) 4 (3) 3 (4) 5

44 The angular momentum of an electron in a given orbit is J, Its kinetic energy will be :

(1) $\frac{1}{2}\frac{J^2}{mr^2}$ (2) $\frac{Jv}{r}$ (3) $\frac{J^2}{2m}$ (4) $\frac{J^2}{2\pi}$

45 When an electron drops from a higher energy level to a low energy level, then :

(1) energy is absorbed (2) energy is emitted

(3) atomic number increases (4) atomic number decreases

46 Angular momentum in 2^{nd} Bohr orbit of H-atom is x. Then angular momentum of electron in I^{st} excited state of Li^{+2} is :

(1) 3x (2) 9x (3) $\frac{x}{2}$ (4) x

47 The maximum energy of an electron in an atom will be at :

(1) Nucleus (2) Ground state

(3) First excited state (4) Infinite distance from the nucleus

48 Energy of first excited state in hydrogen atom is – 3.4 eV then, kinetic energy of electron in same orbit of hydrogen atom is :

(1) + 3.4 eV (2) + 6.8 eV (3) – 13.6 eV (4) + 13.6 eV

49 Potential energy of electron is – 27.2 eV in 2^{nd} orbit of He^{+}. Then total energy of electron in first excited state of Hydrogen atom will be :

(1) –3.4 eV (2) –13.6 eV (3) 3.4 eV (4) 13.6 eV

50 If the potential energy of electron in hydrogen atom is –3.02eV then in which of the following excited level is electron present :

(1) 1^{st} (2) 2^{nd} (3) 3^{rd} (4) 4^{th}

51 The ionisation energy for the H-atom is 13.6 eV. Then the required energy in eV to excite the electron it from the ground state to next higher state will be : (in eV)

(1) 3.4 (2) 10.2 (3) 12.1 (4) 1.5

52 The ionization energy of H-atom is 13.6 eV. The ionization energy of Li^{+2} ion will be :

(1) 54.4 eV (2) 122.4 eV (3) 13.6 eV (4) 27.2 eV

53 The excitation energy of first excited state of a hydrogen like atom is 40.8 eV. The energy needed to remove the electron from ground state of the ion is :

(1) 54.4 eV (2) 122.4 eV (3) 40.8 eV (4) 13.6 eV

54 Match the following

(1) Energy of ground state of He^{+}	(i) + 6.04 eV
(2) Potential energy of I orbit of H-atom	(ii) –27.2 eV
(3) Kinetic energy of II excited state of He^{+}	(iii) 54.4 V
(4) Ionisation potential of He^{+}	(iv) – 54.4 eV

(1) A – (i), B – (ii), C – (iii), D – (iv) (2) A – (iv), B – (iii), C – (ii), D – (i)

(3) A – (iv), B – (ii), C – (i), D – (iii) (4) A – (ii), B – (iii), C – (i), D – (iv)

55 If the binding energy of first excited state of a hydrogen like species is 54.4 eV, then determine the atomic number of the H-like species :

(1) 1 (2) 2 (3) 3 (4) 4

56 What is the ratio of energy of electron of Li^{+2} and Be^{+3} in 2nd bohr orbit.

(1) $\frac{16}{9}$ (2) $\frac{25}{16}$ (3) $\frac{9}{16}$ (4) $\frac{1}{4}$

57 Correct relation between total energy (TE) and potential energy (PE)

(1) $PE = \frac{TE}{2}$ (2) TE = PE (3) $TE = \frac{PE}{4}$ (4) $TE = \frac{PE}{2}$

58 The energy of an electron in an excited H-atom is –1.51 eV. Angular momentum of electron in the given orbit will be

(1) $3h/\pi$ (2) $3h/2\pi$ (3) $2h/\pi$ (4) h/π

59 The ratio of energies of hydrogen atom for first and second excited state is :

(1) 4/1 (2) 1/4 (3) 4/9 (4) 9/4

60 The ratio of potential energy and total energy of an electron in a Bohr orbit of hydrogen like species is

(1) 2 (2) –2 (3) 1 (4) –1

de-Broglie concept & Heisenberg uncertainity principle

61 The de Broglie equation suggests that an electron has

(1) Particle nature (2) Wave nature

(3) Both Particle & wave nature (4) Radiation behaviour

62 de-Broglie wavelength of electron in second orbit of Li^{2+} ion will be equal to de-Broglie of wavelength of electron in

(1) n = 3 of H-atom (2) n = 4 of C^{5+} ion (3) n = 6 of Be^{3+} ion (4) n = 3 of He^{+} ion

63 Select the incorrect relationship among the following :

(1) $\Delta x \times \Delta p \geq \frac{h}{4\pi}$ (2) $\Delta x \times \Delta p \geq \frac{h}{4\pi m}$ (3) $\Delta x \times \Delta V \geq \frac{h}{4\pi m}$ (4) $\Delta E \times \Delta t \geq \frac{h}{4\pi}$

64 What is the de-Broglie wavelength associated with the electron in 3rd orbit of hydrogen :

(1) 9.96×10^{-10} cm (2) 9.96×10^{-8} cm (3) 9.96×10^{4} cm (4) 9.96×10^{8} cm

65 If wavelength is equal to the distance travelled by the electron in one second, then -

(1) $\lambda = \frac{p}{h}$ (2) $\lambda = \frac{h}{m}$ (3) $\lambda = \sqrt{\frac{h}{p}}$ (4) $\lambda = \sqrt{\frac{h}{m}}$

66 The speed of a proton is one hundredth of the speed of light in vacuum. What is its de-Broglie of proton wavelength? Assume that one mole of protons has a mass equal to one gram [h = 6.626×10^{-27} erg sec] :

(1) 13.31×10^{-3} Å (2) 1.33×10^{-3} Å (3) 13.13×10^{-2} Å (4) 1.31×10^{-2} Å

67 A 0.66 kg ball is moving with a speed of 100 m/s. The associated wavelength will be : (h = 6.6×10^{-34} Js)

(1) 6.6×10^{-32} m (2) 6.6×10^{-34} m (3) 1.0×10^{-35} m (4) 1.0×10^{-32} m

68 The wavelength of a charged particle _________the square root of the potential difference through which it is accelerated :

(1) is inversely proportional to (2) is directly proportional to

(3) is independent of (4) is unrelated with

69 If the kinetic energy of an electron is increased 4 times, the wavelength of the de-Broglie wave associated with it would become :

(1) four times (2) two times (3) half times (4) one fourth times

70 What possibly can be the ratio of the de Broglie wavelengths for two electrons each having zero initial energy and accelerated through 50 volts and 200 volts ?

(1) 3 : 10 (2) 10 : 3 (3) 1 : 2 (4) 2 : 1

Shape of orbitals

71 Which orbital is non-directional

(1*) s (2) p (3) d (4) All

72. An orbital with $\ell = 0$ is symmetrical about the :

(1) x-axis only (2) y-axis only (3) z-axis only (4) All

73. Which orbital has two angular nodal planes.

(1) s (2) p (3) d (4) f

74. Which d-orbital does not have four lobes

(1) $d_{x^2-y^2}$ (2) d_{xy} (3) d_{z^2} (4) d_{xz}

75. The number of radial nodes of 5s atomic orbital are

(1) 1 (2) 2 (3) 3 (4) 4

76 A 3p-orbital has

(1) Two non-spherical nodes (2) Two spherical nodes

(3) One spherical and one Radial nodes (4) One spherical and two non spherical nodes

77. Which of the following d-orbitals has dough-nut shape ?

(1) d_{xy} (2) d_{yz} (3) $d_{x^2-y^2}$ (4) d_{z^2}

Quantum Numbers and Electronic configuration

78 Magnetic quantum number specifies -

(1) Size of orbitals (2) Shape of orbitals

(3) Orientation of orbitals (4) Nuclear stability

79 An orbital containing electron having quantum number n = 4, $l = 3$, m = 0 and $s = -\frac{1}{2}$ is called

(1) 3s orbital (2) 3p orbital (3) 4d orbital (4) 4f orbital

80 The maximum number of orbital electrons in a subshell is given by the expression

(1) $4l - 2$ (2) $(2l + 1)$ (3) $2(2l + 1)$ (4) $2n^2$

81 The electrons present in K-shell of the atom will differ in

(1) principal quantum number (2) azimuthal quantum number

(3) magnetic quantum number (4) spin quantum number

82 Number of electrons having $\ell = 1$ and $m=0$ in phosphorous-atom in its ground state :

(1) 3 (2) 1 (3) 2 (4) 0

83 . Maximum number of electrons that can have $n = 3$, $\ell = 2$, $m = +2$, $s = +½$ in an atom are :

(1) 18 (2) 6 (3) 24 (4) 1

84. Which of the following principles limits the maximum number of electrons in an orbital to two

(1) Aufbau principle (2) Pauli's exclusion principle

(3) Hund's rule of maximum multiplicity (4) Heisenberg's uncertainty principle

85._ Number of possible orbitals (all type) in $n = 3$ energy level is

(1) 2 (2) 9 (3) 4 (4) 1

Solution

1 . A

2 C

3. B

4. B

5 A

6 **Ans.**

(2)

@Sol.

Net charge is –1. (17 e+ 18 p)

7. **Sol.** 1 Isoelectronic species should have same number of electrons.

8. **Sol.** **4** It is fact.

9. D

10. D

11. **Sol.** 2 More energy means less wavelength.

12. A

13 A

14 **Sol.** **4** λ (in Å) = $\dfrac{12400 \ \text{eVÅ}}{4\text{eV}}$ = 3100 Å

15 C

16 A

17 **Sol.** **3** According to formula, $E = \dfrac{hc}{\lambda}$

$$3.03 \times 10^{-19} = \frac{hc}{\lambda}$$

$$\lambda = \frac{6.63 \times 10^{-34} \times 3.00 \times 10^{8}}{3.03 \times 10^{-19}}$$

$= 6.56 \times 10^{-7}$ m

$= 6.56 \times 10^{-7} \times 10^{9}$ nm

$= 6.56 \times 10^{2}$ nm = 256 nm

18 **Sol.** 3 $\lambda = \dfrac{hc}{E} = \dfrac{(6.63 \times 10^{-34} \text{ J . s})(3.00 \times 10^{8} \text{ m/s})}{3.31 \times 10^{-20} \text{ J}}$ = 6.01×10^{-6} m

19 **Sol. 1** λ **=** $\dfrac{12400}{2}$ A° **=** 6200 Aº

20 A

21 D

22 B

23 D

24 D

25 A

26 **Sol. 4** For 1st line of Balmer series (3 □□2)

$$E_3 - E_2 = \frac{hc}{\lambda}$$

27 A

28 C

29 **Sol.** 2 When electron falls from n to 1, total possible number of lines = n – 1

30 **Sol. 3** Visible lines □ Balmer series □ 3 lines. (5 □ 2, 4 □ 2, 3 □ 2).

31 C

32 A

33 B

34 B

35 B

36 B

37 A

38 C

39 B

Radius of ground state of hydrogen atom = 0.529 Å

So, $0.529 = 0.529 \times \frac{n^2}{Z}$

$0.529 = 0.529 \times \frac{n^2}{4}$

$\therefore$ $n = 2$

40 **Sol.** 1 $v_3 = v_1 \times \left(\frac{Z}{n}\right)$

$v_3 = 2.18 \times 10^6 \times \left(\frac{1}{3}\right) = 7.27 \times 10^5$ m/s

41 B

42 **Sol. 2** Radius of He^+ is = $\frac{0.53}{2} = 0.265$Å

43 **Sol.** **B** Bohr radius = $= \frac{r_2}{r_1} = \frac{(2)^2}{(1)^2} = 4$

44 **Sol.** A Angular momentum J = mvr

$J^2 = m^2v^2r^2$

or $\frac{J^2}{2} = \left(\frac{1}{2}mv^2\right)$ mr^2 or K.E. = $\frac{J^2}{2mr^2}$

45 B

46 D

47 **Sol. D** It is fact

48 **Sol.** ??? Total energy (E_n) = KE + PE

In first excited state = $\frac{1}{2}mv^2 + \left[-\frac{ze^2}{r}\right]$

$= +\frac{1}{2}\frac{Ze^2}{r} - \frac{ze^2}{r}$

$-3.4 \text{ eV} = -\frac{1}{2}\frac{Ze^2}{r}$

$\therefore \quad KE = \frac{1}{2}\frac{Ze^2}{r}$

$= +3.4 \text{ eV}$

49 A

50 B

51 B

52 **Sol. 2** E_1 for Li^{+2} = E_1 for H × Z^2 [for Li, Z = 3]

= 13.6 × 9 = **122.4 eV**

53 **Sol.**1 $40.8 = (\Delta E)_{2\to1} \times Z^2 \Rightarrow 40.8 = 10.2 \times Z^2 \Rightarrow Z^2 = 4$ or Z = 2

IE = 13.6 Z^2 = 13.6 × 4 = 54.4 eV

54 **Sol.** 3

(1) Energy of ground state of He^+	$= -13.6 \times 2^2 = -54.4$ eV	(iv)
(2) Potential energy of I orbit of H-atom	$= -27.2 \times 1^2 = -27.2$ eV	(ii)
(3) Kinetic energy of II excited state of He^+	$= 13.6 \times \frac{2^2}{3^2} = 6.04$ eV	(i)
(4) Ionisation potential of He^+	$= 13.6 \times 2^2 = 54.4$ V	(iii)

55 **Sol.**4

Given binding energy of Ist excited state (n = 2) = 54.4 eV

$\Rightarrow \quad 3.4 Z^2 = 54.4 \text{ eV} \Rightarrow Z^2 = 16 \Rightarrow Z = 4$

56 C

57 D

58 B

59 D

60 A

61 **Sol.** C An electron has particle and wave nature both.

62 **Sol.** **2** $V \propto \frac{z}{n}$, $\lambda = \frac{h}{mv}$, $\lambda \propto \frac{n}{Z}$ $\therefore \frac{n_1}{Z_1} = \frac{n_2}{Z_2}$ or $\frac{2}{3} = \frac{4}{6}$ (n = 4 of C^{5+} ion)

63 B

64 **Sol.** **2** $v = 2.18 \times \frac{z}{n} 10^6$ m/s

$$\lambda = \frac{h}{mv} = \frac{6.62 \times 10^{-34} \times 3}{9.1 \times 10^{-31} \times 2.188 \times 10^6 \times 1} = 9.96 \times 10^{-8} \text{cm}$$

65 **Sol.** D $\lambda = v$

then $\lambda = \frac{h}{mV}$ or $\lambda^2 = \frac{h}{m}$ So, $\lambda = \sqrt{\frac{h}{m}}$.

66 **Sol.**B $\lambda = \frac{h}{mv} = \frac{6.62 \times 10^{-34} \times 6.02 \times 10^{23} \times 100}{10^{-3} \times 3 \times 10^8}$

67 **Sol C** According to de-Broglie equation, $\lambda = \frac{h}{mv}$

Given, $h = 6.6 \times 10^{-34}$ J s

m = 0.66 kg

$v = 100$ m s^{-1}

$\therefore$ $\lambda = \frac{6.6 \times 10^{-34}}{0.66 \times 100} = 1 \times 10^{-35}$ m

68 **Sol. A** For a charged particle $\lambda = \frac{h}{\sqrt{2mqV}}$, $\therefore$ $\lambda \propto \frac{1}{\sqrt{V}}$.

69 C

70 **Sol. D** $\frac{\lambda_1}{\lambda_2} = \sqrt{\frac{V_2}{V_1}} = \sqrt{\frac{200}{50}} = \frac{2}{1}$.

71 **Sol. A** s orbital is spherical so non-directional.

72 D

73 C

74 C

75 D

76 **Sol.** C Spherical node = n $-\ell-1$

non spherical = ℓ

77 **Sol.** D Factual

78 C

79 D

80 **Sol.** B Maximum no. of electrons in a subshell = 2 (2ℓ + 1) = 4+ 2.

81 **Sol.** D Two electrons in K shell will differ in spin quantum number s = $+\frac{1}{2}$ or $-\frac{1}{2}$.

82 A

83 D

84 **Sol. 2** No two electrons in an atom can have identical set of all the four quantum numbers

85 B