E 46. (a) Neon has 10 electrons ∴ F^- is isoelectronic with Ne

47. (b)

E 48. (d) Since $\nu = 12 \times 10^{14}$ Hz $= \frac{c}{\lambda}$

$\therefore \bar{\nu} = \frac{1}{\lambda} = \frac{\nu}{c}$

$\therefore \bar{\nu} = \frac{12 \times 10^{14}}{3 \times 10^{8}} = 4 \times 10^{6}\ m^{-1}$

$= 4 \times 10^{4}\ cm^{-1}$

E 49. (a) $E_{Total} = \frac{nhc}{\lambda} = nhc \times \bar{\nu}$

$\therefore 1 = n \times 6.6 \times 10^{-34} \times 3 \times 10^{8} \times 2.5 \times 10^{6}$

$\therefore n = 2 \times 10^{18}$

E 50. (b) $K.E = h\nu - h\nu_0 = 6.2 - 4.2$

$= 2\ eV$

$= 2 \times 1.6 \times 10^{-19} (J) = 3.2 \times 10^{-19} (J)$

M 51. (b) $K.E = 5.45 \times 10^{-19}$ (J)

$\therefore T.E = -K.E = -5.45 \times 10^{-19}$ (J)

$$T.E = -\frac{5.45 \times 10^{-19}}{1.6 \times 10^{-19}} \times (eV)$$

$$T.E = -3.40 = \frac{-13.6}{n^2}$$

$\therefore n = 2$

M 52 (d) $\bar{v}_1 = 15200 = R \times 1 \times \left[\frac{1}{4} - \frac{1}{9}\right]$

$$\bar{v}_2 = R \times 9 \times \left[\frac{1}{4} - \frac{1}{9}\right]$$

On dividing $\frac{15200}{\bar{v}_2} = \frac{1}{9}$

$\therefore \bar{v}_2 = 9 \times 15200 = 136800\ cm^{-1}$

M 53. $\lambda = \frac{h}{\sqrt{2m(K.E)}} = \frac{6.6 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 2.8 \times 10^{-}}}$

$\lambda = 9.24 \times 10^{-8}$ m

(E) 54. (c) For 4f orbital

$n = 4$, $l = 3$, m can be from -3 to $+3$

(E) 55 (a) Designation of electron are

(i) 4f (ii) 4s (iii) 3d (iv) 3p

$\therefore$ increasing energy sequence is

(iv) < (ii) < (iii) < (i)

③

E 56. (c) $Cl : [Ne] 3s^2 3p^5$

3p

↑↓	↑↓	↑

For unpaired electron of chlorine
$n = 3, l = 1, m = +1$

E 57. (d) Mg^{2+} has no unpaired electron
Ti^{3+} has 1 unpaired electron $[4s^0 3d^1]$
V^{3+} has 2 unpaired electron $[4s^0 3d^2]$
Fe^{3+} has 5 unpaired electron $[4s^0 3d^5]$

E 58. (c) The designation of electron are
a) 3d b) 4p c) 4d d) 5s
4d has the highest energy

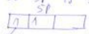
E 59. (a) $\mu = \sqrt{(n+2)(n)} = 1.73$
$\therefore n = 1$ (1 unpaired electron)
∴ electronic configuration of vanadium ion is $[Ar] 4s^0 3d^1$

60. (C)

M 61. (a) Electronic Configuration is

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^2$

5p



2^{nd} last electron

$\therefore$ $n = 5, l = 1, m = -1, s = +\frac{1}{2}$

M 62. (c)

Mn^{2+} : $[Ar] 4s^0 3d^5$ $\therefore$ $n = 5$

Co^{3+} : $[Ar] 4s^0 3d^6$ $\therefore$ $n = 4$

Ni^{2+} : $[Ar] 4s^0 3d^8$ $\therefore$ $n = 2$

V^{2+} : $[Ar] 4s^0 3d^3$ $\therefore$ $n = 3$

$\therefore$ Ni^{2+} is having minimum unpaired electron

M 63. (d) $Z = 45$

$\therefore$ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^7$

$n+l = 5$ is for $3d^{10}, 4p^6, 5s^2$

$\therefore$ Total electron = 18

M 64. (c) $\Delta E = 13.6 Z^2 \left[\frac{1}{1} - \frac{1}{n_2^2}\right] = 13.056$

$\therefore$ $n_2 = 5$

In visible region lines = $(n-2)$

$= 5 - 2 = 3$

M 65. (b) I.E of Li^{2+} = 122.4 eV

$\because$ Energy supplied > I.E.

$\therefore$ Electron gains K.E

$\therefore$ K E gained $= (150 - 122.4)\,eV$
$= 27.6\,eV = 27.6 \times 1.6 \times 10^{-19} \times 10^{-3}\,KJ$
$= 4.4 \times 10^{-21}\,KJ$

E 66. (c) 3s orbital has 2 radial nodes
$\therefore$ (c) is correct

E 67 (d) d_{z^2} because of electron ring lying on xy plane cannot have any angular nodes

E 68. (d) 3dxy is having 2 nodal plane
i.e xz plane and yz plane

D 69. (a) $\mu = \sqrt{n(n+2)} = 2.82$
$\therefore n = 2$
$\therefore$ Mn has 2 unpaired electron
Normal configuration of Mn is
[An] $4s^2\,3d^5$
i.e

4s		3d				
↑↓		↑	↑	↑	↑	↑

To attain 2 unpaired electron, 2 electron from 4s and 3 electron from 3d has to be removed $\therefore$ Charge = 5^+

M 70. (b) $K.E = \frac{1}{2}\frac{KZe^2}{r}$

$P.E = \frac{-KZe^2}{r}$

$\therefore K.E = -\frac{1}{2} P.E$

E 71. (c) Total energy $= \frac{-2\pi^2 m Z^2 e^4 K^2}{n^2 h^2}$

M 72 (c)

$K.E = -T.E$

$\therefore$ T.E in 3rd excited state of $Li^{2+} = \frac{-13.6 \times 9}{16}$ eV

$\therefore K.E = +13.6 \times 9/16$

$P.E = 2T.E$

$\therefore$ P.E in 4th excited state of Be^{3+}

$= 2 \times \frac{-13.6 \times 16}{25}$

$\therefore \frac{K.E}{P.E} = (-)\frac{225}{512}$

E 73. (c) velocity $= \frac{2\pi KZe^2}{nh}$

M 74. (a) Orbital angular momentum $= \left(\sqrt{l(l+1)}\right)\frac{h}{2\pi}$

$\therefore$ for f-subshell $l = 3$

$\therefore$ Orbital angular momentum $= \sqrt{3 \times 4}\,\frac{h}{2\pi}$

$= 2\sqrt{3}\,\frac{h}{2\pi}$

E 75. (c) 4th shell has 4 subshell i.e

4s 4p 4d 4f

Total orbital $= 1+3+5+7 = 16$

D/76. (c) $\nu = 2.34 \times 10^{14}$ Hz

For Paschen series, $n_1 = 3$

$\because \Delta E = h\nu$

$\therefore \Delta E = 6.6 \times 10^{-34} \times 2.34 \times 10^{14}$ (J)

$= 15.44 \times 10^{-20}$ (J)

$= \frac{15.44 \times 10^{-20}}{1.6 \times 10^{-19}} = .965$ (eV)

$\therefore \Delta E = .965 = 13.6 \times 1 \times \left[\frac{1}{9} - \frac{1}{n_2^2}\right]$

On solving $n_2 = 5$

D/77 (c) $r = \frac{.529 \times n_1^2}{1}$

$4r = .529 \times n_2^2$

$\therefore \frac{r}{4r} = \frac{n_1^2}{n_2^2} \quad \therefore \frac{n_1}{n_2} = \frac{1}{2}$

Time period $\propto \frac{n^3}{Z^2} \quad \because Z = 1$

$\therefore$ Ratio of Time period $= \frac{n_1^3}{n_2^3} = \frac{1}{8}$

M/78 (b) $\bar{\nu} = \frac{1}{\lambda} \quad \because \nu = \frac{c}{\lambda} = c\bar{\nu}$

or $\bar{\nu} = \frac{\nu}{c}$

$\therefore \frac{\nu}{c} = RZ^2\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$

For He^+, for transition $n=4$ to $n=2$

$\frac{\nu}{c} = R \times 2^2 \times \left[\frac{1}{2^2} - \frac{1}{4^2}\right]$

For H, for same value of ν, transition will be from $n = 2$ to $n = 1$

M 79.(b) Energy in ground state $= -13.6$ eV

After absorbing 12.1 eV energy,

total energy $= -13.6 + 12.1 = -1.5$ eV

$\therefore \frac{-13.6}{n^2} = -1.5$ or $n^2 = 9$ or $n = 3$

M 80.(d) $(I.E)_H = E_\infty - E_1 = -E_1 = x$ volt

$E_1 = \frac{-13.6}{n^2} = -\frac{13.6}{1} = -13.6 = K$ (constant)

$\therefore K = x$

$\Delta E = E_3 - E_2 = -\frac{13.6}{9} + \frac{13.6}{4}$

$\therefore = \frac{5x}{36}$

M 81.(b) Suppose velocity $= x$

Then de Broglie wavelength $= 100x$

$\lambda = \frac{h}{mv} \quad \therefore 100x = \frac{h}{mx}$

$\therefore x^2 = \frac{1}{100}\frac{h}{m}$ or $x = \frac{1}{10}\sqrt{\frac{h}{m}}$

$\lambda = 100x = 10\sqrt{\frac{h}{m}}$

E 82. (c) $\lambda = \frac{h}{\sqrt{2m\,K.E}} = \frac{h}{\sqrt{2mE}}$

M 83. (a) $\Delta v = \frac{.001}{100} \times 300 = 3 \times 10^{-3}$ m/sec

$\therefore \Delta x \, m \, \Delta v \simeq \frac{h}{4\pi}$

$\Delta x \times 9.1 \times 10^{-31} \times 3 \times 10^{-3} = \frac{6.6 \times 10^{-34}}{4 \times 3.14}$

$\therefore \Delta x = 1.92 \times 10^{-2}$ m

E 84. (a) One set of quantum no. is unique only for one electron

E 85 (b) Since maximum value of $m = +2$
$\therefore$ $l = 2$ only

E 86. (b) For 5th shell, values of azimuthal quantum no. are $l = 0, 1, 2, 3, 4$
$\therefore$ 5th shell will be having g subshell first

E 87. (c) $\lambda = \frac{h}{p}$ $\therefore \frac{\lambda_A}{\lambda_B} = \frac{p_B}{p_A}$

$\frac{5 \times 10^{-8}}{\lambda_B} = \frac{1}{2}$

$\therefore \lambda_B = 10^{-7}$ m

E 88. (a) In 3p-orbital,

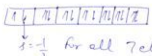
no. of radial nodes $= (n-l-1)$

$= 3-1-1 = \underline{1}$

no. of nodal plane $= l = \underline{1}$

E 89. (d)

E 90. (c)



$s = -\frac{1}{2}$ for all 7 electrons

spinning in the anticlockwise direction