Q1: 24 Feb (Shift 1) - Single Correct

Given below are two statements :

Statement-I: Two photons having equal linear momenta have equal wavelengths.

Statement-II: If the wavelength of photon is decreased, then the momentum and energy of a photon will also decrease.

In the light of the above statements, choose the correct answer from the options given below.

(1) Statement-I is false but Statement-II is true

(2) Both Statement-I and Statement-II are true

(3) Both Statement-I and Statement-II are false

(4) Statement-I is true but Statement-II is false

Q2: 24 Feb (Shift 1) - Numerical

A proton and a Li^{3+} nucleus are accelerated by the same potential. If λ_{Li} and λ_p denote the de Broglie wavelengths of Li^{3+} and proton respectively, then the value of $\frac{\lambda_{Li}}{\lambda_p}$ is $x \times 10^{-1}$. The value of x is ____.

[Rounded off to the nearest integer] [Mass of $Li^{3+} = 8.3$ mass of proton]

Q3: 24 Feb (Shift 2) - Single Correct

According to Bohr's atomic theory :

(A) Kinetic energy of electron is $\propto \frac{Z^2}{n^2}$

(B) The product of velocity (v) of electron and principal quantum number (n). 'vn' $\propto Z^2$.

(C) Frequency of revolution of electron in an orbit is $\propto \frac{Z^3}{n^3}$.

(D) Coulombic force of attraction on the electron is $\propto \frac{Z^3}{n^4}$. Choose the most appropriate answer from the options given below:

(1) (C) only

(2) (A) and (D) only

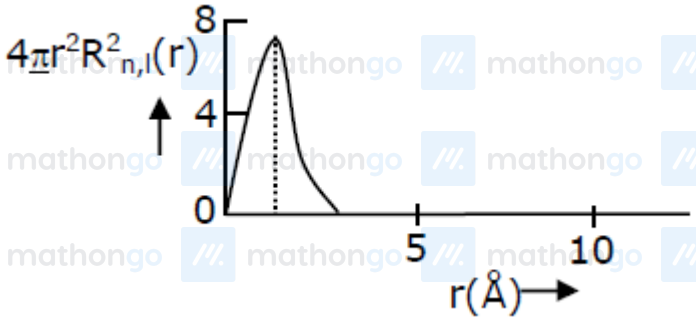
(3) (A) only

(4) (A), (C) and (D) only

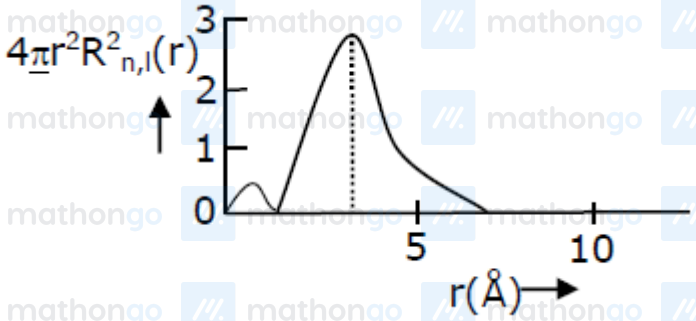
Q4: 25 Feb (Shift 1) - Single Correct

The plots of radial distribution functions for various orbitals of hydrogen atom against 'r' are given below:

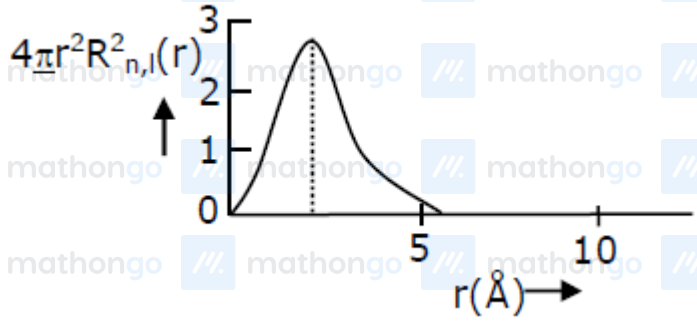
(A)



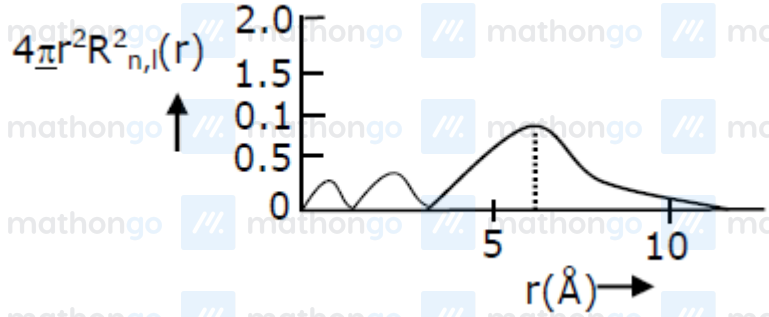
(B)



(C)



(D)



The correct plot for 3 s orbital is:

(1) D

(2) B

(3) A

(4) C

Q5: 25 Feb (Shift 2) - Numerical

Electromagnetic radiation of wavelength 663nm is just sufficient to ionize the atom of metal A. The ionization energy of metal A in $kJmol^{-1}$ is ____. (Rounded off to the nearest integer)

$\left[h = 6.63 \times 10^{-34} Js, c = 3.00 \times 10^{8}\ ms^{-1},\ N_A = 6.02 \times 10^{23}\ mol^{-1}\right]$

Q6: 26 Feb (Shift 1) - Single Correct

The orbital having two radial as well as two angular nodes is

(1) 5 d

(2) 4f

(3) 3p

(4) 4 d

Q7: 26 Feb (Shift 2) - Numerical

A ball weighing 10 g is moving with a velocity of 90 ms^{-1}. If the uncertainty in its velocity is 5%, then the uncertainty in its position is ____ $\times 10^{-33}$ m. (Rounded off to the nearest integer) [Given : $h = 6.63 \times 10^{-34} Js$]

Answer Key

Q1 (4) **Q2** (2) **Q3** (2) **Q4** (1)

Q5 (180) **Q6** (1) **Q7** (1)