

## Questions with Answer Keys

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## Q1: 16 March (Shift 1) - Numerical

When light of wavelength 248nm falls on a metal of threshold energy 3.0eV, the de-Broglie wavelength of emitted electrons is \_\_\_\_ \AA. (Round off to the Nearest Integer).

$$[\text{Use: } \sqrt{3} = 1.73, h = 6.63 \times 10^{-34} \text{ J s}$$

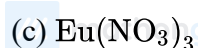
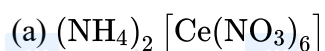
$$m_e = 9.1 \times 10^{-31} \text{ kg; } c = 3.0 \times 10^8 \text{ ms}^{-1}$$

$$\text{1eV} = 1.6 \times 10^{-19} \text{ J}]$$

## Q2: 16 March (Shift 2) - Single Correct

Arrange the following metal complex/ compounds in the increasing order of spin only magnetic moment.

Presume all the three, high spin system. (Atomic numbers Ce = 58, Gd = 64 and Eu = 63.)



Answer is:

(1)  $(b) < (a) < (c)$

(2)  $(c) < (a) < (b)$

(3)  $(a) < (b) < (c)$

(4)  $(a) < (c) < (b)$

## Q3: 16 March (Shift 2) - Numerical

The number of orbitals with  $n = 5$ ,  $m_l = +2$  is \_\_\_\_

(Round off to the Nearest Integer).

## Q4: 17 March (Shift 1) - Single Correct

What is the spin-only magnetic moment value (BM) of a divalent metal ion with atomic number 25, in it's aqueous solution?

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(1) 5.92

(2) 5

(3) zero

(4) 5.26

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**Q5: 17 March (Shift 1) - Numerical**

A certain orbital has  $n = 4$  and  $m_L = -3$ . The number of radial nodes in this orbital is \_\_\_\_ (Round off to the Nearest Integer).

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**Q6: 17 March (Shift 2) - Numerical**

In the ground state of atomic Fe ( $Z = 26$ ), the spin-only magnetic moment is \_\_\_\_  $\times 10^{-1}$  BM. (Round off to the Nearest Integer).

[ Given :  $\sqrt{3} = 1.73, \sqrt{2} = 1.41$  ]

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**Q7: 18 March (Shift 1) - Single Correct**

A certain orbital has no angular nodes and two radial nodes. The orbital is:

(1) 2s

(2) 3s

(3) 3p

(4) 2p

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**Q8: 18 March (Shift 2) - Single Correct**

Given below are two statements:

Statement I : Bohr's theory accounts for the stability and line spectrum of  $\text{Li}^+$  ion.

Statement II : Bohr's theory was unable to

explain the splitting of spectral

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lines in the presence of a

magnetic field. In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both statement I and statement II are true.
- (2) Statement I is false but statement II is true.
- (3) Both statement I and statement II are false.
- (4) Statement I is true but statement II is false.

