RAMAKRISHNA MISSION VIDYAMANDIRA
(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIRST SEMESTER EXAMINATION, DECEMBER 2016
FIRST YEAR [BATCH 2016-19]

Date : 15/12/2016   **CHEMISTRY [General]**

Time : 11 am – 1 pm   **Paper : I**   Full Marks : 25

[Answer <u>one</u> question from <u>each</u> unit]

<u>Unit – I</u>   [13 marks]

1. a) Calculate the electronegativity of chlorine from the following data : bond energies (Kcal/mole) for $H_2(104)$, $Cl_2(57)$, $HCl(102)$ and $\chi_H = 2 \cdot 1$. [3]

    b) Write the IUPAC name of the element having atomic number 103 and 109. [2]

    c) Explain how atomic radii of elements vary along the periods and groups of 'S' block elements. [1+2]

    d) Define nuclear stability interms of n/p ratio. [2]

    e) Derive the energy expression of an electron in hydrogen atom using Bohr's theory. [3]

2. a) With the help of Hund's rule write down the electronic configuration and find out the number of unpaired electrons present in the elements with atomic number 16 and 24 respectively. [3]

    b) What do you mean by half-life and average life of a radioactive element? [2]

    c) Give the set of four values of quantum numbers that describes the electron in 3p orbitals. [2]

    d) Radius of the first Bohr orbit of H-atom is $0 \cdot 529$Å. Find the radii of the first and second Bohr orbits of Li^+ ions. [3]

    e) What is electron affinity (EA)? Explain the following EA value (KJ/mole). [3]

Li	Be	B	C	N	O	F
59·8	≃0	83·0	127·5	≃0	140·9	327·9

<u>Unit – II</u>   [12 marks]

3. a) State the postulates of Werner's co-ordination theory. [4]

    b) What do you mean by radius ratio? What information can be obtained from it? [3]

    c) PCl_5 but not NCl_5 can be synthesized—why? [2]

    d) Write IUPAC nomenclature for the following complex.
    (i) $[Co(en)_2Cl_2]Cl$, (ii) $[Pt(NH_3)(Cl)(Br)(Py)]$, (iii) $[Ni(en)_3]Cl_2$ [en = ethylenediamine] [3]

4. a) Define lattice energy. Establish Born-Haber cycle for the formation of sodium chloride crystal from metallic sodium and gaseous chlorine. [2+3]

    b) Give an example of chelate complex with structure. [2]

    c) Explain with reasons :
    i) $LiClO_4$ is hydrated
    ii) $MgSO_4$ is fairly soluble in H_2O but $BaSO_4$ is insoluble in H_2O. [1·5+1·5]

    d) According to the VSEPR theory determine the shape of the following species :
    XeF_4, NH_4^+ [1+1]

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