RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. SECOND SEMESTER EXAMINATION, MAY 2012

FIRST YEAR

Date : 21/05/2012 **CHEMISTRY (Honours)**

Time : 11 am – 12.15 pm Paper : II Full Marks : 25

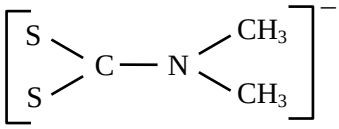
Group – C

Unit – I

(Answer **any one** question)

9. a) State Bent's rule. Explain the structure of POF_3 and PCl_3F_2 molecules by applying Bent's rule. [1+2]
   b) What are the differences between Frenkel defects and Schottky defects? [2]
   c) Define Lattice Energy and write down the Born-Lande Expression of Lattice energy for NaCl type crystal and explain the terms involve in it. [1+1+2]
   d) Write down the limitations of Heitler-London concept of bonding. [1]
   e) Using VSEPR theory predict the shapes of $[TeCl_6]^{2-}$ ion and IF_7 molecule, indicating the state of hybridisation of the central atom in each case. [1·5×2]
   f) What do you mean by equivalent and non equivalent hybrid orbitals, give examples. [1+1]

10. a) What is radius ratio rule? Calculate the limiting radius ratio for the co-ordination number six (octahedral) (C.N. = 6) [1+2]
   b) The formation of Calcium Bromide is described by the following equation
   $Ca(s) + Br_2(\ell) \rightarrow CaBr_2(s)$. Establish Born-Cycle for the formation of calcium bromide. [3]
   c) Explain why CsF is more soluble than LiF in water. [2]
   d) ZnO on heating turns yellow but becomes white on cooling. —Explain. [2]
   e) Arrange the following molecules according to their increasing order of polarity.
   BeF_2, H_2O and N_2O [2]
   f) The dimethyldithiocarbamate ion, $[S_2CN(CH_3)_2]^-$, has the following skeletal structure : [1+1+1]



   Give the important resonance structures of this ion. Select the canonical form which is likely to provide the best description of this ion and calculate the formal charge on the C, N and S atoms in that structure.

Unit – II

(Answer **any one** question)

11. a) Answer **any two** of the following : [2×2]
      i) Alkali metals are good reducing agents. —Explain.
      ii) Crown 4 selectively complexes Li^+, Crown 5 complexes best with Na^+ and crown 6 best with K^+. —Explain
      iii) What are Zintil Salts.
      iv) Though Cu, Ag and Au are same subgroup elements with similar outer electronic configurations however with different stable oxidation state —Explain
      v) Give two examples of co-ordination compounds of alkali metals.
   b) What do you mean by (**any two**) : [2×2]
      i) Purple of Cassions
      ii) Fulminating Gold

iii) Paris Green

iv) Unusual oxidation states of Gold

c) Answer the following (**<u>any one</u>**) :

A. i) Gold can form Aurides but Copper does not. —Justify [1]

ii) Gold is soluble in one single acid– write with proper equations. [1]

B. Compare and justify the melting points of Zinc, Cadmium and Mercury. [2]

12. a) How could be sodide ions generated and stabilized? [1·5]

b) Explain why complex forming ability of Group IIA (Alkaline earth) metal ions changes as $Be^{2+} > Mg^{2+} > Ca^{2+} > Sr^{2+} > Ba^{2+}$. [2]

c) Discuss the structure and bonding of $BeCl_2$ in solid and vapour state. [3]

d) Explain why Hg is liquid at room temperature where that of Zn and Cd is solid. [2]

e) While Na_2CO_3 is stable whereas Li_2CO_3 readily decomposes on heating. —Explain [1·5]