RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, MAY 2016

SECOND YEAR [BATCH 2014-17]

Date : 20/05/2016 **CHEMISTRY (Honours)**

Time : 11 am – 1 pm **Paper :** IV (Gr-C) Full Marks : 25

[***Attempt <u>one question</u> from <u>each Unit</u>***]

<u>Unit – I</u>

1. a) Compare the chemistry of N, P, As and Sb with reference to their (i) hydrides and (ii) hydrolytic behaviour of halides. [2+3]
   b) The H-F bond is most polar among the H-X (X = halogen), but HF is weakest acid —explain. [2]
   c) CO_2 or SiO_2 can't act as a good ligand with low-valent metals as like CO. —Explain. [2]
   d) Complete the following reactions :
      i) $XeF_6 + SiO_2 \rightarrow$
      ii) $XeF_6 + 3H_2 \rightarrow$ [2]
   e) Discuss the diagonal relationship between Be and Al. [2]

2. a) Comment of the oxidation state of Tl in $T\ell I_3$ with evidence. [2]
   b) Explain the poor stability of highest oxidation state of bismuth with evidence. [2]
   c) The d_{O-O} value of O_2H_2 (149 pm) > O_2F_2 (121·8 pm) —explain. [2]
   d) How will you prepare ultrapure germanium from its ore? [2]
   e) Catenation power of carbon is unlimited while that of silicon is limited. —Explain. [2]
   f) Graphite is a good conductor while inorganic graphite is an insulator. —Explain. [2]
   g) Draw the Lewis structure of P_4. [1]

<u>Unit – II</u>

3. a) Discuss the structure and bonding of diborane. [4]
   b) What are interhalogen compounds? Mention the synthesis and uses of Wijs reagent. [3]
   c) Use the VSEPR model to prredict the probable shapes of (a) PCl_4^+, (b) PCl_4^-, (c) $AsCl_5$. [3]
   d) Describe the application of boron nitride. [2]

4. a) How will you prepare ammonium perdisulphate? Give it's an analytical importance. [2+1]
   b) Phosphorus centre of $P_3N_3Cl_6$ is more reactive than nitrogen —why? [2]
   c) SiF_4 reacts with $(CH_3)_4NF$ to form $[(CH_3)_4N][SiF_5]$. Use the VSEPR rules to determine the shape of the cation and anion in the product. [3]
   d) Assuming that each sulfur and nitrogen atom carries a lone pair, predict whether S_2N_2 could be described as aromatic. [2]
   e) What happens when acidic manganous solution is treated with perxenate salt? [2]

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