B.Sc. (Honours) Examination, 2018

Semester-III (CBCS)
Chemistry (Honours)
Core Course: CC-5
(Inorganic Chemistry)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin.
Answer ***any four*** questions.

1. Attempt ***any four***: 4x2.5
   a) Aqueous solution of NH_4Cl becomes more acidic in presence of excess formaldehyde. Explain.
   b) Boric acid becomes relatively stronger in a concentrated aqueous solution. Explain.
   c) Deduce the working formula to compute pH of an aqueous solution having the composition: 0.1(M) NH_4Cl + 0.2(M) CH_3COONa.
   d) Superacidity of fluorosulfonic acid (HSO_3F) is increased in presence of SbF_5. Explain.
   e) Explain the order of Lewis acid strength of SnF_4, $SnCl_4$ and $SnBr_4$.

2. Attempt ***any four***: 4x2.5
   a) What is silane? Describe their chemical reactivities.
   b) Briefly describe about different types of silicones.
   c) Write a short note on phosphazene.
   d) Discuss the bonding feature of XeF_2 in the light of molecular orbital theory.
   e) XeF_2 is an oxidizing and fluorinating agent. Justify the statement with suitable examples.

3. Attempt ***any four***: 4x2.5
   a) Differentiate ortho and para hydrogen.
   b) The chemistry of lithium is different from its congeners. Justify.
   c) Berilium chemistry is much different from that of other group II metals. Discuss in the light of complex formation ability.
   d) Elucidate the structural features of $BeCl_2$ and mention the hybridization involved.
   e) $SnCl_2$ is stronger reducing agent than $PbCl_2$. Why?

4. Attempt ***any four***: 4x2.5
   a) Borazine is called inorganic benzene. Critically examine the statement.
   b) Discuss briefly the structural aspect of inorganic graphite.
   c) $SiCl_4$ is easily hydrolyzed, but not CCl_4. Explain.
   d) Predict the shape of BrF_3. Does it autoionize? Justify your answer.
   e) Fluorine is powerful oxidant than chlorine though electron affinity of chlorine is higher. Give reason(s).

5. Attempt ***any four***: 4x2.5
   a) What do you mean by mineral, gangue and ore? An ore deposit contains 60 wt% Fe as hematite. Calculate the wt% of gangue in that ore deposits.
   b) Match Column (A) of metal with Column (B) to the corresponding principal mineral:

Column (A)	Column (B)
Fe	Calamine
Al	Rutile
Cu	Gibbsite
Zn	Chalcocite
Ti	Siderite

P.T.O.

c) What is Ellingham diagram? Is the diagram valid for impure metal and oxide? Why is it also called the oxygen potential diagram?
d) How does the slope of the line change in free energy-temperature diagram when (i) metal melts and (ii) metal oxide melts? Give reasons.
e) Briefly outline the principle behind Kroll process and Van Arkel-de Boer process for purification of metals.

6. Attempt ***any four***: 4x2.5
a) What is interhalogen compound? Mention their special features.
b) Compare NH_3 and PH_3 as ligand.
c) Briefly describe zone refining process for purification of metal.
d) Zenon fluorides are moisture sensitives – justify the statement with proper explanation.
e) Compare the structure of H_3PO_3 and H_3AsO_3, and predict their acid strength order.
f) Differentiate graphite and diamond.

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