2020-21

Time - 3 hours
Full Marks – 60

*Answer **all groups** as per instructions.*
Figures in the right hand margin indicate marks.
Candidates are required to answer
in their own words as far as practicable.

Group-A

1. Answer all questions or fill in the blanks as required. [1x8]
   a) Name one element which is purified by zone refining.
   b) The curves in the _____obtained by plotting temperature and standard Gibb's free energy.
   c) Which one is Lewis base?
      OH^-, $AlCl_3$, NH_3, SO_3
   d) Cations which are large in size, have lower charge, easily polarisable called _____acids.
   e) Alkali metals dissolve in liquid ammonia from blue coloured _____solution due to electrons.
   f) What is the hybrid state of Xe in XeF_6?
   g) Among Ge^{2+}, Pb^{2+} and Sn^{2+} ions, Pb^{2}+ is stable due to _____.
   h) The polyhedral boranes that contains framework of carbon and boron atoms are called_____.

Group-B

2. Answer any eight of the following questions within two or three sentences each. [$1\frac{1}{2}$x8]
   a) What is hydrometallurgy?
   b) Classify into acids and bases $SiCl_4$, RNH_2, Na^+
   c) Name three native metals.

d) Define catenation. Give an example.

e) What is the structural difference between red and yellow phosphorus?

f) B^{3+}ions do not exist. Explain.

g) What is the shape of ClF_3, and find the number of lone pairs and bond pairs.

h) Give two uses of Helium.

i) Name the oxoacids of Chlorine.

j) Kr and Xe form compounds with oxygen and fluorine. Explain.

GROUP-C

3. Write notes on any eight of the followings within 75 words: [2x8]

a) What is Mond's process?

b) How is crude Zirconium metal purified to give pure metal?

c) Give two limitations of Bronsted-Lowry concepts of acids and bases.

d) The following reaction does not proceed to completion. Explain.

$CuF_2 + 2CuI \rightarrow CuI_2 + 2CuF$

e) What are polyprotic acids? Give an example.

f) OF_4 does not exist but SF_4, is a strong Lewis acid. Explain.

g) Discuss the anomalous behaviour of Baryllium.

h) Name two peroxo acids of Sulphur.

i) What are the shapes of IF_5, and IF_7, with their hybrid state of central atom?

j) BF_3, exists and BH_3, does not exist. Explain.

GROUP- D

4. Answer any four questions within 500 words each. [6x4]

a) Discuss about Ellingham diagram for reduction of metal oxides using carbon and carbon monoxide.

b) Write notes on:

I) Bronsted-Lowry concept of acid and base

II) Lewis concpt of acid and base

c) Discuss about HSAB principles and its applications.

d) Write notes on:

I) Inert pair effect

II) Complex formation tendency of s and p-block elements

e) Discuss about the classification of hydrides with their properties.

f) Discuss preparation, properties and structure of Boric acid.

g) How is XeF_2 prepared? Discuss its properties and structure.

*****