UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Inorganic Chemistry II
Program: B.Sc. (H) Chemistry
Course Code: CHEM2001

Semester: III
Time 03 hrs.
Max. Marks: 100

Instructions: Attempt all the questions. Internal choice is given in Q 10 and Q 12.

SECTION A

S. No.		Marks	CO
Q 1	Explain why the M.P. and B.P. of alkaline earth metals are higher than those of alkali metals. Is there any trend in the M.P. and B.P. of Group-II members going down in a group?	4	CO1
Q 2	If you burn Ca, Sr, Ba and Mg metals salts to the Bunsen flame, which color they will impart?	4	CO1
Q 3	Give reason, why NH_3 has higher boiling point than PH_3 ?	4	CO2
Q 4	Write name and structure of two oxoacids of phosphorous.	4	CO2
Q 5	What do you mean by pseudohalides and pseudohalogens? Give two examples of each.	4	CO2

SECTION B

Q 6	Write down the definition of the term ore and mineral. Gives one example of following types of ores: Oxide ores, Sulphide ores, Carbonate ores and native Metals.	8	CO3
Q 7	Standard Gibbs Free energy of formation $\left(\Delta G_f^0\right)$ of Cr_2O_3, MgO and HgO, are -1056, -570 and -59 kJmol^{-1} respectively. Using Ellingham concept, explain why Hg cannot reduce MgO to Mg, while Mg can reduce Cr_2O_3 giving suitable balance equation.	8	CO3
Q 8	What are phosphazines? Discuss the structure of important chlorophosphazines.	8	CO1
Q 9	Discuss preparation and structure of Marshall's acid and Sulfuric acid.	8	CO2
Q 10	Draw the molecular orbital diagram of XeF_2. OR Draw the structure of two examples of crown ethers of Alkali metals.	8	CO2

SECTION-C

Q 11	**a)** Explain the preparation of silicones from chlorosilane.
	 b) Discuss the synthesis and structure of hydrazoic acid.
	 c) Magnesium can be easily determined by EDTA titration at pH 10, using Eriochrome Black-T as indicator. An ore of Mg (200 mg), was converted into 100 mL of Mg^{+2} solution using some known procedure. An aliquot (25.0 mL) was titrated against 0.02 mM EDTA solution as per above method. The amount of EDTA used was found to be 25.0 mL at end point. Find out-
	     (i) Molarity of the magnesium ion solution in mM.
	     (ii) The amount of the Mg present in 100 mL of the solution.
	     (iii) The percentage content of Mg in the ore.
		5
		 5
		 10
			CO2;
			 CO2;
			 CO2

| Q 12 | **a)** (i) Write down the representative reactions of the Group I elements with H_2, O_2, N_2, H_2O through sketch.
(ii) How will you prepare acetate and nitrate of Beryllium? Give the balanced reactions.

OR
(i) Discuss the ease of formation, thermal stability and solubility of hydrides of the Alkali metals.
(ii) Write a short note on superoxides of Alkali and Alkaline earth metals.

b) (i) Urea is a better manure than ammonium sulphate and calcium ammonium nitrate, justify the statement.
(ii) Arrange the following compounds in increasing order of acidity and support your answer with reason. HOCl, HOBr, HOI

OR
Explain geometry and one method of synthesis of following compounds.
(i) $XeOF_4$
(ii) XeO_2F_2 | **10 +10** | CO2;
CO2 |