

Name:  
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES  
Online End Semester Examination, December 2020

Course : Inorganic Chemistry II  
Program : B.Sc. (H) Chemistry  
Course Code: CHEM 2001

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

Section A

Instructions:

1. Each Question will carry 5 Marks
2. Complete the statement /select the correct answer(s)
3. Answer should be short, fill in blank, true or false.
4. You have to very careful to write the answer.

S. No.	Question	CO
Q 1	(a) The N atom in $(\text{SiH}_3)_3\text{N}$ molecule involves in the ..... hybridization. (b) Diamond and graphite are .....of carbon. (c) Boron shows similar properties with.....due to diagonal relationship. (d) Body centred cubic and comparatively low densities property is the key components of first group elements. (True or False) (e) Number of OH groups in hypophosphoric acid is.....	CO1
Q 2	(a) Diborane can be prepared by the reaction of .....with..... (b) The shape of $\text{PCl}_5$ is ..... (c) Peroxomonosulphuric acid is also known as..... (d) The shape of the $\text{SF}_4$ molecules is ..... (e) Mention any two examples of pseudohalogens.	CO2
Q 3	If you burn metal chlorides/sulphates salts of group-I elements of S-block to the Bunsen flame, which colour you will get? Mention the name of <b>any five</b> element with their colour only.	CO1
Q 4	Bauxite- [A], Classiterite- [B], Salt Petre- [C], Karnalite- [D] and Calamine [E] are the ores of which metals. Write their name citing A, B, C, D and E.	CO3

Q 5	Group-I elements have ..... M.P. <b>and</b> ..... B.P, ..... to cut with a knife, ..... metallic bond, <b>and</b> ..... in effective nuclear charge than those of Group-II elements. Fill the blank lines using appropriate words as given: Stronger/Weaker, Lower/Higher, Easy/Hard, Increase/Decrease.	CO1
Q 6	(a) Beryllium does not react with steam. <b>True/False</b> (b) Potassium, Rubidium and Caesium can form all types of oxides, when burnt in air. <b>True/False</b> (c) .....of group-I can form only normal oxide and peroxide. (d) X, Y and Z of group-II can form only normal oxides. Write down the name of the elements X, Y, and Z. (e) Potassium ion has.....charge and .....polarizing power than barium ion. <b>higher/lower</b>	CO1
<b>Section B</b>		
<b>Instructions:</b>		
<b>1. Each question will carry 10 marks</b> <b>2. Write short/brief notes of 1-2 page answer.</b> <b>3. Question 11 has internal choices, and hence you have to attempt only one out of two questions.</b> <b>4. Draw the neat diagram, to justify your answer as well as to score higher marks.</b>		
Q 7	(a) Arrange BBr <sub>3</sub> , BCl <sub>3</sub> and BF <sub>3</sub> in correct order of acidic strength and give reason in detail with help of structure of molecules. (b) Explain why heavier p-block elements show reluctance to involve p-orbitals in pi-bonding.	CO2
Q 8	(a) Discuss the reason why tetrahalides of carbon is not hydrolysed by water while tetrahalides of silicon is readily hydrolysed. (b) Draw the structure of any two types of silicates.	CO2
Q 9	Determine the hybridization and draw structure of the following compounds (a) ClF <sub>3</sub> (b) IF <sub>5</sub> (c) XeF <sub>4</sub> (d) XeOF <sub>4</sub> (e) XeO <sub>2</sub> F <sub>2</sub>	CO2
Q 10	(a) Standard Gibbs free energy of formation ( $\Delta G_f^0$ ) of PbO, Cr <sub>2</sub> O <sub>3</sub> and HgO are -217, -1056, and -59 kJ/mol respectively. Using Ellingham concept and giving suitable balance equation, justify you observation that which metal oxide cannot be reduce to metal by others metals. (b) Explain any two methods for preparation of the ores alongwith neat sketch.	CO3

Q 11	<p>Arrange <math>\text{HClO}_4</math>, <math>\text{HClO}_3</math>, <math>\text{HClO}_2</math> and <math>\text{HClO}</math> in correct order of acidic strength with suitable reason. Also, draw the structure of all the four compounds.</p> <p style="text-align: center;"><b>OR</b></p> <p>Write the reaction for the synthesis of borazine and draw the structure.</p>	<b>CO2</b>
<p><b>Section C</b></p> <p><b>Instructions:</b></p> <p><b>1. Question is of 20 marks</b></p> <p><b>2. Write long answer of &gt;2 page answer.</b></p> <p><b>3. Draw the neat diagram, to justify your answer.</b></p> <p><b><u>4. Internal choices is there for 12(a) and 12(b), and hence you have to attempt both 12 (a) and 12(b)</u></b></p>		
Q 12	<p>(a) Write down a brief note and citing two examples of each, and draw the structures of crown ethers and cryptand useful for complexation with the alkali metals.</p> <p style="text-align: center;"><b>OR</b></p> <p>Describe the thermal stability, solubility and ease of formation of metal hydrides of the group-I elements.</p> <p>(b) Zinc (m.w. 65 gm/mol) can be easily determined by EDTA titration at pH 10, using Eriochrome Black-T as indicator. An ore of the Zinc (400 mg) was dissolved to make 250 mL of Zn (II) solution, by some known techniques. An aliquot (20.5 mL) was titrated against 3.15 mM EDTA solution as per above method. The amount of EDTA used was 12.2 mL, when colour of the solution changed to blue from wine red. Write the answer only up to two decimal by round off rule, find out the:</p> <ul style="list-style-type: none"> <li>(i) Molarity of the Zn (II) ion solution in mM.</li> <li>(ii) The amount of the Zinc present in 250 mL of the solution in milligram.</li> <li>(iii) The percentage content of Zn in the ore.</li> <li>(iv) Draw the structure of Zn-EDTA complex, mentioning the bonds with a neat sketch.</li> </ul> <p style="text-align: center;"><b>OR</b></p> <p>Explain in details the relative thermal stability of the carbonates and hydroxides of the elements of First and Second Group.</p>	<b>CO1</b>