

- (b) Compare the structure, acidic strength, and thermal stability of oxoacids of sulphur: H_2SO_3 and H_2SO_4 . Which one is a better oxidizing agent and why?
- (c) What are silicates? What is the basic structural unit of silicates? Give one example of a silicate mineral. 5+5+5
6. (a) Write short notes on the following:
- lonic vs covalent nature H_2O , H_2S , H_2Se , H_2Te
 - Thermal stability trend in HF , HCl , HBr , HI
- (b) (i) Give one method of preparation of Caro's acid and explain its structure.
 (ii) Draw the structure of Marshall's acid.
- (c) What are cryptates? How do they differ from crown ethers in terms of structure and stability of their alkali metal complexes? Give two applications of cryptands. 5+5+5=15

This question paper contains 4 printed pages]

Your Roll No. :

Sl. No. of Q. Paper : **263** **I**

Unique Paper Code : 2173552001

Name of the Paper : DSE: Main Group
Chemistry

Name of the Course : **B.Sc. (Prog.) Industrial
Chemistry**

Semester : IV/VI

Time : 2 Hours **Maximum Marks : 60**

Instructions for Candidates :

- Write your Roll No. on the top immediately on receipt of this question paper.
 - Attempt any **FIVE** questions in **all**.
 - All** questions carry equal marks.
1. (a) What are standard electrode potentials (SEP)? What are the categories in which metals are divided based on SEP? 5

- (b) Discuss the structure and oxidation states of chlorine in its oxoacids: HOCl , HClO_2 , HClO_3 and HClO_4 . How does their thermal stability and oxidizing power vary with the number of oxygen atoms? 5
- (c) Describe the Van Arkel-de Boer process and explain how it is used to obtain high-purity zirconium. 5
- 2.** Write short notes on the following (**any three**)
5+5+5=15
- (a) Metallic character trend in s-block elements.
- (b) Alkali metal solutions in liquid ammonia.
- (c) Diagonal relationship in periodic table
- (d) Anomalous behavior of Lithium
- 3.** (a) Write the chemical reaction for the preparation of borazine. Discuss its structure and highlight its similarities with benzene. 5

- (b) Compare the structure and basicity of the following oxoacids: H_3PO_3 (phosphorous acid), H_2SO_4 and HClO_4 . 5
- (c) Explain the zone refining process for the purification of germanium. 5
- 4.** (a) Explain the structure and hydrolysis of P_4O_6 and P_4O_{10} . Why is P_4O_{10} a good dehydrating agent?
- (b)(i) Write a note on the structure of oxyacids of sulphur.
- (ii) Write the general formula of ortho-, pyro- and cyclo- silicates.
- (c)(i) Discuss the acidic/basic nature, thermal stability, and hydrolysis products of the N_2O_5 .
- (ii) Discuss the structure and acidic nature of any one oxide of sulphur.
5+5+5=15
- 5.** (a) Explain the significance of an Ellingham diagram in metallurgy. Why do most Ellingham diagram lines have a positive slope?