LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

THIRD SEMESTER – **APRIL 2025**

CH 3507 – MAIN GROUP ELEMENTS & SOLID STATE CHEMISTRY

Date: 29-04-2025 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

Section-A

Answer any FOUR questions. **(4 × 10 = 40)**

1. Discuss the preparation and properties of peroxides and superoxides of alkali metals.
2. a) How are the crown ethers used to complex the alkali metals?
   b) Outline the biological importance of sodium-potassium pump. (5+5)
3. a) Classify the silicates and explain the structural features of glass.
   b) Describe the extraction of boron from its ore. (5+5)
4. Illustrate the reactions of boron hydrides with ammonia and in hydroboration.
5. Explain the metallic and nonmetallic character of group-15 elements in the periodic table.
6. List out the anomalous behaviors of fluorine.
7. Discuss the oxidation number and hybridization of oxoacids of chlorine.
8. Explain the Schottky and Frenkel defects with suitable examples.

Section-B

Answer any THREE questions. **(3 × 20 = 60)**

9. Illustrate the anomalous behavior of Li and Be in their respective group in the periodic table.
10. a) Discuss the ionic, interstitial, and covalent carbides with examples.
    b) Illustrate the preparation and properties of oxides of sulphur. (10+10)
11. a) Write a note on the amphoteric nature of aluminium oxide and hydroxide.
    b) Outline the structural features and uses of fullerene and carbon nanotubes. (10+10)
12. Outline the formation and characteristics of the following oxides with examples.
    (i) Mono oxide (ii) Acidic oxide (iii) Basic oxide (iv) Amphoteric oxide
13. How is the available chlorine in bleaching powder estimated by any two methods? Explain them in detail.
14. a) Write a note on the seven crystal systems.
    b) Derive Bragg's equation and explain the principles of X-ray diffraction. (10+10)
