

2023**Time - 3 hours****Full Marks - 60**

*Answer all groups as per instructions.
Figures in the right hand margin indicate marks.*

GROUP – A

1. Fill in the blanks. (all) [1 × 8
- (a) The metal that is prepared in pure state by Van Arkel process is _____.
- (b) _____ compound is used to extract gold from gold ore.
- (c) In liquid HF solvent, PF_5 acts as a _____ acid.
- (d) Smaller the size of metal ion _____ is its inherent acidity.
- (e) _____ phosphorous is prepared by heating mercury with PBr_3 at 240°C .
- (f) Ti^{3+} is better oxidant than In^{3+} due to _____.
- (g) In XeF_5^- , the Xenon element undergoes _____ type of hybridisation.
- (h) The chemical formula of inorganic benzene is _____.

[2]

GROUP – B

2. Answer any eight of the following questions within two to three sentences each. [1½ × 8]

- (a) What is the thermodynamic principle of metallurgy ?
- (b) How does zone refining method help to refine impure metals ?
- (c) What is the effect of substituents on hardness and softness of an acid or a base ?
- (d) Define Lux-Flood concept of acid and bases. Give an example.
- (e) Why Tl^+ is more stable than Tl^{3+} ion ?
- (f) Why lithium shows anomalous behaviour ?
- (g) What are pseudohalogens ? Give one example.
- (h) Why boric acid cannot be titrated against NaOH ?
- (i) What is the trend in the reactivity of noble gases ?
- (j) How polymer differs from macromolecules ? Give examples.

GROUP – C

3. Answer any eight of the following questions within 75 words each. [2 × 8]

- (a) What is the function of parting process in metallurgy ? Give one example.

[3]

- (b) How is Mond's process helpful in purifying metals ? Give examples.
- (c) What is HSAB principle ? Explain with examples.
- (d) What is the effect of solvents on the strength of acids and bases ?
- (e) Describe the relative stability of oxidation states of group-15 elements.
- (f) What do you mean by inert pair effect ? Explain with one example.
- (g) What are interhalogen compounds ? Describe the structure of IF_5 .
- (h) Describe the structure of N_2O molecule ?
- (i) Describe the shape of $XeOF_2$ molecule.
- (j) How do inorganic polymers differ from organic polymers ?

GROUP – D

Answer *all* questions within 500 words each.

4. Define electrolytic reduction process. Explain its principle with suitable examples. [6]

OR

Describe bonding in hard-hard and soft-soft interactions.

[4]

5. Discuss in details the allotropic forms of sulphur. [6]

OR

Describe the preparation, properties and structure of basic beryllium nitrate.

6. Name various oxyacids of chlorine. Discuss the relative strength, oxidising power and thermal stability among them. [6]

OR

Describe the preparation, properties and structure of orthoboric acid.

7. Write the preparation, properties and structure of XeF_4 . [6]

OR

What are silicates ? Describe the chemistry of orthosilicates and cyclic silicates.