LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **APRIL 2023**

UCH 1501 – BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date: 09-05-2023 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

Part –A

Answer all questions **(10 x 2 = 20)**

1. Arrange the following atoms in the increasing order of ionisation energy: C, N, O.
2. What is inert-pair effect?
3. Will the bond length of NO be shorter or longer than NO^+? Give reasons.
4. What are redox reactions? Cite an example.
5. Select oxidizing and reducing agents in the following redox reaction :
   $3N_2H_4 + 2\ BrO_3^- \rightarrow 3N_2 + 2Br^- + 6H_2O$
6. Write the number of lone pair and bonded pairs of electron in NH_3 molecule.
7. How many σ and π bonds are present in XeO_3?
8. Derive the bond order of N_2 molecule from its electronic configuration.
9. What are the main causes of the anomalous properties of fluorine?
10. What are pseudo halogens? Cite any two examples.

Part-B

Answer any EIGHT questions. **(8 × 5 = 40)**

11. Highlight any four factors affecting the ionic radii.
12. Calculate the electronegativiy of lead using Allred –Rochow procedure (At. No of Pb is 82; r_{Pb}=1.53Å)
13. a) Differentiate valency and oxidation number. b) Find out the oxidation number of chromium in i) $CrOCl_2$ ii) $K_2Cr_2O_7$ iii) $KCrO_4$ (2+3)
14. Balance the following equations by ion-electron method:
    i) $FeCl_3 + SnCl_2 \rightarrow FeCl_2 + SnCl_4$
    ii) $MnO_4^- + C_2O_4^{2-} \rightarrow Mn^{2+} + CO_2$
15. How does valence bond theory explain the formation of NH_3 molecule?
16. How does band theory explain the conducting properties of metals, insulators and semiconductors?
17. Discuss the postulates of VSEPR theory and predict the actual geometry of ClF_3.
18. Write a brief note on the preparation, properties and uses of I_2O_5.
19. Highlight the principle involved in the estimation of available chlorine in bleaching powder.
20. Differentiate superconductors and semiconductors with suitable examples.
21. Predict the types of hybridization and geometry in SF_6 molecule.
22. Discuss the Arrehenius and Lux-Flood concept of acids and bases.

Part-C

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

23. Discuss the diagonal relationship of lithium and magnesium.
24. Calculate the equivalent weight of $KMnO_4$ in acidic, neutral and alkaline medium with the expected chemical reactions.
25. Discuss HSAB principle and any two of its applications.
26. How does molecular orbital theory explain the bond order and magnetic properties of the following species: O_2, O_2^-, O_2^{2-}, O_2^+, O_2^{2+}.
27. Highlight the applications of liquid ammonia as solvent for
    (i) acid-base reactions (ii) precipitation reactions
    (iii) complex formation reactions (iv) alkali metals
28. Explain the principle involved in iodometric and iodimetric titrations with suitable examples.