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B.Sc. (CBCS) (Semester V)
EXAMINATION NOVEMBER 2022
Chemistry
Inorganic Chemistry

[Duration : 2 Hours]

[Total Marks :80]

Instructions :

- 1) All questions are **compulsory**, however **internal** choice is available.
- 2) Briefly answer sub-questions in question 1 and question 4
- 3) Figures to the **right** indicate maximum marks to the question/sub-question
- 4) Answers to the **two** Sections should be written in separate answer books.
- 5) Use of non-programmable calculator is **allowed**

SECTION A

1. Answer ANY FOUR of the following: -

(4×4=16)

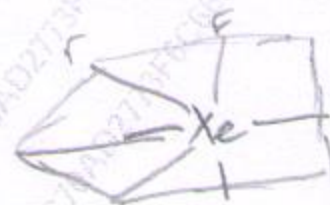
- i) Define a) Vander Waals radius b) Ionic radius. Give the trend of Vander Waals radius and ionic radius in a group and period of the periodic table.
- ii) What are iso-electronic ions? Comment on the radii of iso-electronic ions giving examples of any two ions.
- iii) What are polyhalides? Give the different types of Polyhalides with one example of each type and give any two properties of Polyhalides.
- iv) Why are Interhalogens better halogenating agents than halogens? Give two methods of preparation of interhalogens.
- v) Explain structure and bonding in XeF_6 .
- vi) With the help of neat, labelled energy band gap diagrams explain the conductivity of p-type and n-type semiconductor.

2. A) Answer the following questions:-

- i) Define Ionization energy and explain why "Ionization energy increases with the increase in nuclear charge." 3
- ii) What is Colour-center? Why does its presence impart color to an otherwise colorless ionic crystal-like NaCl? 3

OR

1



SECTION B

4. Answer ANY FOUR of the following: -

(4×4=16)

- Discuss precipitation method to verify structures of $\text{CoCl}_3 \cdot x\text{NH}_3$.
- Explain stereochemistry of coordination compounds with coordination number 4.
- Give an application of Electrochemical Series to check feasibility of reactions.
- What is a Latimer diagram? Give Latimer diagram for Chlorine in acidic solution.
- Describe three types of nanomaterials.
- Write a short note on: Metalloporphyrins.

5. A) Answer the following questions: -

- Draw a neat labelled molecular orbital diagram for $[\text{Ti}(\text{H}_2\text{O})_6]^{+3}$ ion. 3
- Briefly explain three important factors that affect stability of complexes. 3

OR

- Discuss π -bonding in co-ordination compounds, involving different types of ligands. 3
- Explain the terms:
a) Standard Electrode Potential b) Electrochemical Series. 3

B) Answer the following questions: -

- Write a note on: Carbon nanotubes. 4
- Define: essential elements. Give the main functions of sodium and potassium in biological systems. 2

6. A) Answer the following questions: -

- Explain the features of Frost diagram giving a neat labelled diagram. 3
- Justify the difference in magnetic property of $[\text{FeF}_6]^{-3}$ and $[\text{Fe}(\text{CN})_6]^{-3}$ ions. 3

OR

- A) iii) With a suitable diagram, explain redox stability field of natural waters. 3
- iii) Discuss Nephelauxetic effect as an evidence of covalent bonding in complex compounds. 3
- B) Answer the following questions: -
- i) Give the applications of nanomaterials in three different fields. 3
- ii) What are metalloenzymes? Name two metalloenzymes and their functions. 3