Total No. of Printed Pages:4

B.Sc. (CBCS) (Semester V)
EXAMINATION NOVEBER 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 it's presence impart color to an otherwise colorless ionic crystal-like NaCl? **3**

OR

SECTION B

4. Answer **ANY FOUR** of the following: - **(4×4=16)**

   i) Discuss precipitation method to verify structures of $CoCl_3.xNH_3$.

   ii) Explain stereochemistry of coordination compounds with coordination number4.

   iii) Give an application of Electrochemical Series to check feasibility of reactions.

   iv) What is a Latimer diagram? Give Latimer diagram for Chlorine in acidic solution.

   v) Describe three types of nanomaterials.

   vi) Write a short note on: Metalloporphyrins.

5. A) Answer the following questions: -

   i) Draw a neat labelled molecular orbital diagram for $[Ti(H_2O)_6]^{+3}$ ion. **3**

   ii) Briefly explain three important factors that affect stability of complexes. **3**

   OR

   A) iii) Discuss π-bonding in co-ordination compounds, involving different types of ligands. **3**

   iv) Explain the terms: **3**
   a) Standard Electrode Potential b) Electrochemical Series.

   B) Answer the following questions: -

   i) Write a note on: Carbon nanotubes. **4**

   ii) Define: essential elements. Give the main functions of sodium and potassium in biological systems. **2**

6. A) Answer the following questions: -

   i) Explain the features of Frost diagram giving a neat labelled diagram. **3**

   ii) Justify the difference in magnetic property of $[FeF_6]^{-3}$ and $[Fe(CN)_6]^{-3}$ 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