No. of Printed Pages : **2**

# 21CHE1C1L

## M.Sc. I Semester Degree Examination, April/May - 2024

## CHEMISTRY

### Concepts and Models of Inorganic Chemistry

### (NEP)

Time : 3 Hours Maximum Marks : 70

***Note :*** *Answer* ***any five*** *of the following questions with Question* ***No. 1 (Q1) Compulsory****, each question carries* ***equal*** *marks.*

| | | | |
|---|---|---|---|
| **1.** | (a) | Briefly describe Fajan's rule and its significance in the properties of ionic compounds. | **5** |
| | (b) | What is the Born-Haber cycle, and how is it applied in understanding the properties of NaCl ? | **5** |
| | (c) | Derive Born-Lande equation. | **4** |
| **2.** | (a) | Explain with suitable example the VSEPR theory and how it is related to the shapes of molecules ? | **5** |
| | (b) | Describe the factors that can affect coordination numbers in coordination compounds. | **5** |
| | (c) | Discuss the concepts of resonance and hybridization emphasizing their importance in understanding molecular structures. | **4** |
| **3.** | (a) | Explain the synthesis, properties and structure of boron hydrides. | **5** |
| | (b) | Describe the oxides and oxy acids of sulfur. | **5** |
| | (c) | Provide an overview of the properties and applications of silicates and zeolites. | **4** |
| **4.** | (a) | Discuss the trends in properties and spectral and magnetic behavior of 3d elements. | **5** |
| | (b) | Explain the stability of oxidation states and catalytic properties of d-block elements. Briefly | **5** |
| | (c) | Briefly discuss the synthesis and separation of trans-uranium elements. | **4** |
| **5.** | (a) | Provide an overview of solution effects in liquid ammonia and anhydrous sulfuric acid. | **5** |
| | (b) | Explain the leveling effect and its significance in generalized acid-base reactions. | **5** |
| | (c) | Discuss the Irving-Williams series of acid-base interactions. | **4** |

**P.T.O.**

**6.** (a) What is the electron sea model in metallic bonding, and how does it differ from the VBT approach ? **5**

(b) Write a note on metal-metal bonding and cluster compounds. **5**

(c) What are Interhalogen compounds, and how do they differ from noble gas compounds ? **4**

**7.** (a) Outline the trends in physical and chemical properties of lanthanides, emphasizing the concept of lanthanide contraction. **5**

(b) Describe the back strain, front strain and their impact on acid-base reactions. **5**

(c) Explain the theoretical basis of hardness and softness in HSAB concept. **4**

**8.** (a) Explain the types of simple ionic compounds briefly. **5**

(b) Determine the bond order in delocalized π-bonding systems for $CO_3^{2-}$. **5**

(c) Discuss the classification of acid-base. **4**

**- o 0 o -**