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Time: 3 Hours

The Assam Royal Global University, Guwahati
Royal School of Applied and Pure Sciences
Programme: M.Sc Chemistry Semester = 2nd
Semester End Examination, June 2023
Course Title : Inorganic Chemistry I
Course Code : CHY014C202

Maximum Marks: 70

Note: Attempt all questions as per instructions given.

The figures in the right-hand margin indicate marks.

Section - A

1. Attempt *all questions*. (Maximum word limit 50) 2 x 8
- Why water contracts when heated between 0 °C – 4 °C?
 - Discuss the geometry of I₃⁻ ion w.r.t VSEPR theory.
 - What is Irving Williams series?
 - Arrange the following in the increasing order of crystal field stabilization energy. Give reason for your answer: [Rh(NH₃)₆]³⁺, [Ir(NH₃)₆]³⁺, [Co(NH₃)₆]³⁺
 - Justify the statement “All Arrhenius acids are Bronsted acids but all Arrhenius bases are not Bronsted bases”.
 - What are Pourbaix diagrams?
 - Draw the structure of one metalloborane.
 - How is iodine number determined?

Section - B

2. Attempt *any two* of the following: 6 x 2
- Define Walsh diagram. How can you predict the geometry of triatomic molecule like H₃⁺ ion? 2+4
 - Discuss the modified molecular orbital diagram for CO molecule. Give the electron charge density diagram for bonding and anti-bonding molecular orbital. 4+2
 - What do you know about the London forces? Apply the concept of Bent's rule to PCl₃F₂ molecule. 3+3
3. Attempt *any two* of the following: 7 x 2
- Discuss the magnetic property of [Co(NH₃)₆]³⁺ and [CoF₆]³⁻ with the help of MOT.
 - What is the significance of formation constant? Show that overall formation constant is equal to the multiplication of stepwise formation constants. Write a note on steric effects and electron delocalization effecting stability of complexes. 2+3+2
 - Discuss the σ- and π-bonding molecular orbital diagram of a complex with tetrahedral geometry.