



**UNIVERSITY OF NORTH BENGAL**  
B.Sc. Honours 4th Semester Examination, 2021

**GE4-CHEMISTRY**

Full Marks: 40

**ASSIGNMENT**

*The figures in the margin indicate full marks.  
All symbols are of usual significance.*

*Use separate Answer scripts for Section-A (Inorganic) and Section-B (Physical)*

**SECTION-A**

**INORGANIC CHEMISTRY**

**Answer any two from the following**

10×2 = 20

1. (a) Write down the basic difference between double salt and coordination compound. 2
- (b) Write down the IUPAC nomenclature of the following complex compounds: 2
  - (i)  $K_3[Fe(CN)_6]$
  - (ii)  $[Cr(NH_3)_6][Co(CN)_6]$
- (c) Define bridging ligands with examples. 2
- (d) Discuss linkage isomerism with suitable examples. 2
- (e) What is spectrochemical series? 2
  
2. (a) Zr and Hf have almost similar properties. Why? 3
- (b) Cu(I) is diamagnetic whereas Cu(II) is paramagnetic. Explain. 2
- (c) Discuss the splitting of d-orbitals in tetrahedral field of ligands. 4
- (d) What is the oxidation state of Os in  $K_2[OsCl_5NH_3]$ ? 1
  
3. (a) Explain, with suitable examples, the terms inner orbital and outer orbital octahedral complex. 3
- (b) Discuss the electronic configuration of lanthanoids. Why does Eu exhibit +2 oxidation state instead of +3 oxidation state? 2+2
- (c) Discuss the factors on which  $\Delta_0$  depend. 3
  
4. (a) The magnetic moment of  $[MnBr_4]^{2-}$  is 5.9 BM. Predict the structure with the help of valence bond theory. 2½
- (b) Which of the following ion will undergo Jahn-Teller distortion and why: 3
  - (i) Low spin octahedral  $d^6$
  - (ii) High spin octahedral  $d^5$ .

- (c) Write down the differences between lanthanide ions and first series of transition metal ions. 2½
- (d) Calculate CFSE for high spin octahedral complex of metal having four electrons in its d-orbitals. 2

**SECTION-B**

**PHYSICAL CHEMISTRY**

**Answer any two from the following**

10×2 = 20

5. (a)  $A + A \rightarrow \text{Product}$  4  
 Derive the rate constant for this Second Order Reaction.
- (b) What is Half Life? Derive the Half Life Period of a Second Order Reaction. 1+2
- (c) A First Order Reaction Completed its 75% in 32 minutes. What is the Half Life of the reaction? 3
6. (a) Define Surface Tension. What is its unit? 2+1
- (b) Give the relation between Temperature and Coefficient of viscosity. 2
- (c) Write down the differences between Order and Molecularity. 3
- (d) Give a method to determine the Order of a reaction. 2
7. (a) What are the causes of deviation of gases from ideal behaviour? 2
- (b) Derive the Van der Waal's Equation of state:  $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$ . 4
- (c) Give the SI units of the Van der Waal's Constants,  $a$  and  $b$ . 2
- (d) Calculate the Root Mean Square Velocity of  $\text{CO}_2$  molecule at  $27^\circ\text{C}$ . 2
8. (a) Write down the expression for Maxwell's distribution of molecular velocities, explaining the terms involved. 2
- (b) Discuss the effects of Temperature on the distribution of molecular velocities. 3
- (c) Write short notes on: Collision theory and Transition State theory. 2½+2½

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