

**U.G. 5th Semester Examination - 2021****CHEMISTRY**

Course Code : BCEMCCHC501

Course Title : Inorganic Chemistry-IV

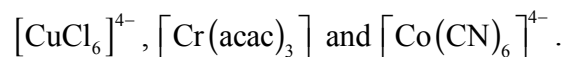
Full Marks : 30

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*1. Answer any **ten** questions from the following:

1×10=10

- Name a chief ore of chromium with chemical composition.
- Write down the selection rules for electronic transition.
- Draw the crystal field splitting diagram for a complex in a linear field. Assume that the ligands lie on the Z-axis.
- Which of the following expected to show J-T distortion?



[Turn Over]

- Find out the ground state term symbol for  $\text{V}^{3+}$  ion.
- Which type of electronic transition is responsible for the bright orange colour of  $[\text{Fe}(\text{bpy})_3]^{2+}$ ?
- What is Neel temperature?
- Why cation exchange resins in the acid form absorb  $\text{La}^{3+}$  ions more strongly than  $\text{Lu}^{3+}$  ions from aqueous solution?
- Why  $\text{Au}(\text{II})$  is disproportionates in solution?
- State the hybridization of Co in  $[\text{Co}(\text{NH}_3)_6]^{3+}$  according to VBT.
- Complete the reaction:  $\text{Cu}_2\text{Cl}_2 + \text{ethylene} \rightarrow$ .
- Why the magnetic property of  $[\text{Co}(\text{NH}_3)_6]\text{F}_3$  changes when it is heated to  $120^\circ\text{C}$ ?
- Calculate the spin only magnetic moment in BM for  $\text{K}_2[\text{MnF}_4]$ .
- Give an example of molecular nitrogen complex of Ruthenium.
- What is the valence shell electronic configuration of Pd (palladium)?

2. Answer any **five** questions from the following:

$$2 \times 5 = 10$$

- a) Why electronic spectrum of  $[\text{CoF}_6]^{3-}$  shows two maxima in the visible region?
- b) What is Zeise salt? Mention its unique structure features.
- c) "The element of  $\text{Ln}^{3+}$  ions gives rise to multiple sharp peaks"—comment.
- d) Why 4d and 5d metal ions form square planar complexes readily than tetrahedral complexes?
- e) Write the preparation method and draw the structure of  $\text{Na}_7[\text{Cu}(\text{IO}_6)_2]$ .
- f) A green solution is obtained by mixing a colourless solution of  $[\text{Pt}(\text{NH}_3)_4]^{2+}$  with a pink solution of  $[\text{PtCl}_4]^{2-}$  — Explain.
- g) Among  $\text{Ni}(\text{CO})_4$  and  $[\text{Co}(\text{CO})_4]^-$ , which one has greater infrared stretching frequency for C–O bond? Justify your answer.
- h)  $\text{Fe}_3\text{O}_4$  has an inverse spinel structure while  $\text{Mn}_3\text{O}_4$  has a normal spinel structure.— Explain the observation from CFT.

3. Answer any **two** questions from the following:

$$5 \times 2 = 10$$

- a)
  - i) What is Nephelauxetic effect? Among  $\text{F}^-$  and  $\text{I}^-$ , which one is expected to have greater Nephelauxetic effect?
  - ii) Describe the term Lanthanide contraction.  $3+2=5$
- b)
  - i) What is magnetic super exchange? "Cu(II) formate tetrahydrate shows a room temperature paramagnetic moment much below the normal value"— Account for the fact.
  - ii) Define ferromagnetism and antiferromagnetism with example in each case.  $(1+2)+2=5$
- c)
  - i) What happen when
    - A)  $\text{KMnO}_4$  is added to a saturated solution of baryta.
    - B) Ammonium vanadate is ignited?
  - ii) Write the electronic configuration of Osmium.  $(2 \times 2)+1=5$