



Seat No. \_\_\_\_\_

**H AJ-003-2015005**

**B. Sc. (Sem.-V) (CBCS) (WEF-2019)**

**Examination**

**May - 2023**

**Inorganic and Industrial Chemistry : C-501**

**Faculty Code : 003**

**Subject Code : 2015005**

Time :  $2\frac{1}{2}$  Hours / Total Marks : 70

- Instructions :**
- (1) This question paper contains five questions, each of 14 marks. All are compulsory.
  - (2) Figures to the right indicate full marks of sub question.
  - (3) Write answers of all questions in main answer sheet.

- 1 (a) Answer the following questions : 4
- (1) Define : Term symbol.
  - (2) What is spin multiplicity ?
  - (3) Give the ground state spectral term for  $\text{Co}^{+2}$  ion.
  - (4) What is the value of L for D-term ?
- (b) Answer any one : 2
- (1) Draw the Orgel diagram of F-states.
  - (2) Explain  $l-l$  coupling in  $d^2$ -case with vector diagram.
- (c) Answer any one : 3
- (1) Explain the Hund's rule.
  - (2) Explain Hole formalism with  $d^1$  and  $d^9$  case.
- (d) Answer any one : 5
- (1) Explain Holepegon diagram with  $p^2$ - case
  - (2) Calculate the microstates for  $d^2$ -case.

- 2 (a) Answer the following questions : 4
- (1) Give two examples of strong ligand.
  - (2) Define : Pairing energy.
  - (3) Draw  $d_{x^2-y^2}$  and  $d_{xy}$  orbitals.
  - (4) Calculate S, L and J values for  $^3F$ .
- (b) Answer any one : 2
- (1) Draw only splitting of d-orbitals in octahedral field and give formula of CFSE.
  - (2) Prove that  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is diamagnetic in nature.
- (c) Answer any one : 3
- (1) Explain High spin and low spin complexes with pairing energy.
  - (2) Explain factors affecting on splitting energy (any two).
- (d) Answer any one : 5
- (1) Discuss orbital angular momentum contribution to magnetic momentum of complexes.
  - (2) Write short note on "Jahn-Teller Effect".
- 3 (a) Answer the following questions : 4
- (1) Absorption spectra of  $\text{Ni}^{+2}$  is \_\_\_\_\_ in colour.
  - (2) Define : Allowed transition.
  - (3) Give examples of decolorizing agent in glass.
  - (4) Write formula of Dolomite.
- (b) Answer any one : 2
- (1) Explain orbital selection rules.
  - (2) Define glass by physically and chemically.
- (c) Answer any one : 3
- (1) Give name of main raw material used in glass.
  - (2) Give position of main peak and transition with diagram of absorption spectra of  $[\text{Ni}(\text{H}_2\text{O})_6]^{+2}$ .
- (d) Answer any one : 5
- (1) Discuss electronic transition spectrum of  $\text{Cu}^{2+}$  complex.
  - (2) Discuss manufacture of Glass.

- 4 (a) Answer the following questions : 4
- (1) Define : Fertilizers.
  - (2) Write formula of Biuret.
  - (3) Which element is necessary for osmosis and ionic balance in plants ?
  - (4)  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  is also known as \_\_\_\_\_
- (b) Answer any one : 2
- (1) What are micro nutrients ? Give examples.
  - (2) Explain action of  $\text{CaCN}_2$  as fertilizer.
- (c) Answer any one : 3
- (1) Explain properties of Fertilizers.
  - (2) Explain classification of fertilizers.
- (d) Answer any one : 5
- (1) Explain manufacture of urea by Sindri method with action of urea as fertilizer.
  - (2) Discuss manufacturing process of triple superphosphate with diagram.
- 5 (a) Answer the following questions : 4
- (1) Which pigment is added to obtain red cement ?
  - (2) Write formula of  $\text{C}_3\text{A}$ .
  - (3) Give formula of Sorel cement.
  - (4) What is soundness of cement ?
- (b) Answer any one : 2
- (1) Explain the term Portland cement.
  - (2) What is water proof cement ?
- (c) Answer any one : 3
- (1) Explain quality of cement and setting of cement.
  - (2) Explain reactions occurring during cement manufacturing.
- (d) Answer any one : 5
- (1) Discuss manufacture of Portland cement with diagram.
  - (2) Give ISI specification of cement and uses of cement.