(common for Analytical, Organic & Inorganic)

**MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)**

**M.Sc. (Chemistry) Sem-II : WINTER :- 2021**

# SUBJECT: INORGANIC CHEMISTRY - II

**Day :** Thursday
**Date 3/2/2022**

**W-20145-2021**

Time : 02:00 PM-05:00 PM
Max. Marks: 60

---

**N.B.**

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in **SEPARATE** answer books.
4) Draw neat and labelled diagrams **WHEREVER** necessary.
5) Use of non-programmable **CALCULATOR** is allowed.

---

## SECTION – I

**Q.1** Answer **ANY THREE** of the following: **(15)**

**a)** Write the assumptions of molecular orbital theory.

**b)** Describe the method of extraction of iron metal from haematite ore.

**c)** What are variable oxidation states? Write the variable oxidation states of first series of transition metals.

**d)** Estimate the number of unpaired electrons in $[NiCl_4]^{-2}$ complex ion.

**e)** Write a note on – 'Magnetic properties of complex metal ions'.

**Q.2 a)** Answer **ANY TWO** of the following: **(10)**

**i)** Explain the V.B. presentation of the following complex ions
**1)** $[Cu(NH_3)_4]^{-2}$ $\mu$=1.8 B.M. **ii)** $[MnCl_4]^{-2}$ $\mu$=5.95 B.M.

**ii)** Prove the geometry of $[NiCl_4]^{-2}$ complex ion.

**iii)** Write a note on 'Limitations of Valence Bond Theory'.

**b)** Solve **ANY ONE** of the following: **(05)**

**i)** Calculate the CFSE in $\Delta_o$ units for the following 'd' orbital configuration.
**1)** $d^4$ Octahedral strong ligand field.
**2)** $d^7$ Octahedral strong ligand field.

**ii)** Calculate the magnetic moments in B.M. units for the following complex ions
**1)** $[Cr(OX)_3]^{-3}$ **2)** $[Ni(en)_3]^{+2}$ [Given : At. No. Cr = 24, Ni = 28].

**P.T.O.**

## SECTION – II

**Q.3** Answer **ANY THREE** of the following: **(15)**

**a)** Write biological importance of sodium and potassium in biological system.

**b)** What is lanthanide contraction? What are causes and consequences of lathanide contraction?

**c)** Explain any two methods for synthesis of carbonyls.

**d)** Explain following copper metallo enzymes:
**i)** Super oxide dismutase **ii)** Cytochrome C oxides.

**e)** Draw the structures of following carbonyl compounds.
**i)** $V(CO)_6$ **ii)** $Ir_4(CO)_{12}$ **iii)** $Fe(CO)_5$

**Q.4** Answer **ANY THREE** of the following: **(15)**

**a)** Explain natural and artificial nitrogen fixation.

**b)** What are transuranic elements? Explain any one method for preparation of transuranic elements.

**c)** Write the reaction mechanism for Hydro formulation process for conversion of alkene to aldehyde.

**d)** What is Misch metal? Write the preparation and uses of Misch metal.

**e)** Write a note on : Polynuclear Iron containing proteins.

* * *