

**M. SC. (ANALYTICAL CHEMISTRY) / M. SC. (ORGANIC CHEMISTRY)
/M. SC. (INORGANIC CHEMISTRY) SEM-II (CHOICE BASED CREDIT &
GRADE SYSTEM) WINTER -2017
SUBJECT : INORGANIC CHEMISTRY – II**

Day : Wednesday
Date : 25/10/2017

W-2017-0771

Time : 03.00 PM TO 06.00 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 book.
- 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) What do you mean by inner sphere mechanism and outer sphere mechanism? Explain them in brief.
- c) Write the important ores of iron metal and write the method of preparation of wrought iron from pig iron.
- d) Write the distribution of d^7 and d^9 electrons of a metal ion in a strong and weak ligand fields in an octahedral complex.
- e) Explain the geometry and magnetic properties of $[\text{Cr}(\text{NH}_3)_6]^{+3}$ and $[\text{NiCl}_4]^{-2}$ complex ions according to V.B. Theory.

Q.2 A) Answer any **TWO** of the following: **(10)**

- a) Define variable oxidation states. Write the variable oxidation states for first series of 'd' block metals.
- b) Draw a crystal field splitting diagrams for :
 - i) A tetrahedral ligand field
 - ii) Octahedral ligand field.
- c) Write a note on : "Magnetic properties of complex metal ions".

B) Solve any **ONE** of the following: **(05)**

- a) Calculate the number of unpaired electrons in $[\text{NiCl}_4]^{-2}$ complex ion.
- b) Calculate the CFSE in Δ_0 units for the following systems:
 - i) d^3 – tetrahedral weak field
 - ii) d^7 – octahedral strong field

SECTION – II

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

- a) What are actinides? Explain any two methods for the preparation of actinides.
- b) Define organometallic compound. Explain how sigma and Pi bonds are formed in metal carbonyl compounds.
- c) Describe the ion exchange method for the separation of Lanthanides.
- d) Explain biological importance of sodium and potassium.
- e) Count the total number of electrons in following metal carbonyls and state whether they follow $18 \bar{e}$ rule or not [At No. Ni = 28, Mn = 25]
 - i) $\text{Ni}(\text{CO})_4$
 - ii) $\text{Mn}_2(\text{CO})_{10}$

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

- a) What are trans-uranic elements? Explain bombardment with accelerated particle process.
- b) How copper is biologically important? Explain the role of super oxide dismutase.
- c) Explain Wacker's process used for synthesis of Aldehyde.
- d) What is Lanthanide contraction? What is the cause of Lanthanide contraction? Explain in brief.
- e) Write a note on – "Sandwich compound".

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