MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)
M.Sc. (Chemistry) Sem-II AC,OC : WINTER- 2022
SUBJECT : INORGANIC CHEMISTRY - II

Day : Friday

Time : 10:00 AM-01:00 PM

Date : 30-12-2022

W-20145-2022

Max. Marks : 60

N.B.:

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

SECTION-I

Q.1 Attempt **ANY THREE** of the following: **[15]**

a) Write assumptions of VBT to explain bonding in metal complexes.

b) Draw the M-O energy level diagram for $[Ni(NH_3)_6]^{+2}$ and comment upon the magnetic properties of the complexes.

c) Write the distribution of d^5 and d^8 electrons of the metal ion in a strong and weak ligand field in an octahedral complex.

d) Explain the terms 'Labile complex' and 'inert complex' with suitable examples.

e) Write the names of important ores of Nickel and explain in brief metallurgy of Nickel.

Q.2 A) Attempt **ANY TWO** of the following: **[10]**

a) Explain the application of CFT to octahedral complexes.

b) What is ligand substitution reaction? Explain Dissociative mechanism for complexes.

c) Discuss the magnetic properties of $[Cr(NH_3)_6]^{+3}$ and $[Mn\ Cl_4]^{-2}$ according to the VB Theory.(At. No. Cr = 24, Mn = 25)

Q.2 B) Attempt **ANY ONE** of the following: **[05]**

a) Show the distribution of d^4 and d^5 electrons of a metal ion in a strong and weak ligand field in a tetrahedral complex. Calculate CFSE in Dq in this metal ion.

b) Explain Puddling process for purification of Pig iron.

SECTION-II

Q.3 Attempt **ANY THREE** of the following: **[15]**

a) How Iron is important in biological systems? Explain the role of Hemoglobin and Myoglobin in detail.

b) Explain the biological importance of zinc:
i) Alkaline Phosphatase ii) Carbonic Anhydrase

c) What is Lanthanide contraction? Explain the effect on lanthanide contraction on post lanthanide elements.

d) Count the total number of electrons in following metal carbonyls and state whether they follow 18 electron rule or not. (At. No. Mo = 42, Fe = 26)
i) $Mo(CO)_6$ ii) $Fe(CO)_5$

e) Explain general methods for synthesis of metal carbonyls.

Q.4 Attempt **ANY THREE** of the following: **[15]**

a) Explain the process of Photosynthesis in details.

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

c) What are different applications of Lanthanide elements and their compounds?

d) Explain biological importance of Sodium and Potassium.

e) Explain the bonding in metal carbonyls. Why carbonyl is considered as important Pi – acid ligand?

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