MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

Reg. No.										

DEPARTMENT OF SCIENCES, I SEMESTER M.Sc., (Chemistry)
END SEMESTER EXAMINATIONS, (Makeup) March 2022
Inorganic Chemistry-I [CHM 5101]
(CBCS Scheme)

Time: 2 Hours Date: 14 March 2022 MAX. MARKS: 40

Note: (i) Answer **any four full** questions.
(ii) Draw diagrams, and write equations wherever necessary

1.A. (i) Explain the terms mean, median. Calculate the standard deviation for an element whose percentage in a sample were found to be 20.8, 21.6, 22.1, 22.0, 23.3, 21.9 and 22.8 %.
(ii) Explain four different steps involved in gravimetric method of analysis.

B. What is Born-Haber cycle? How can we obtain energy of a solid with its help? Write the importance of lattice energy.

C. What is valence bond theory of bonding? How does valence bond theory account for bonding in H_2 molecule? **[4+3+3]**

2 A. (i) Describe briefly the mechanism of precipitate formation in gravimetric analysis.
(ii) With example distinguish between precision and accuracy.

B. Find the following compounds hybridization, geometry, magnetic nature and outer or inner orbital complex with the help of valence bond theory.
(a) $[Fe(CN)_6]^{4-}$ (b) $[Fe(CN)_5NO]^{2-}$

C. Draw and explain the shape of MO obtained by the overlap of $p_z - p_z$ and $p_x - p_x$ (or p_y-p_y) atomic orbitals **[4+3+3]**

3 A. i) Explain the application of transition metal complexes in nitrogen fixation.
ii) Compare and contrast the properties of ionic and interstitial hydrides.

B. Discuss in details the band model of metallic bond.

C. Write explanatory notes on hydrogen bond and explain H_2O has a higher boiling point while H_2S and H_2Te are gases? **[4+3+3]**

4 A. How is diborane prepared? Explain the bonding features of diborane.
ii) How is ClF3 synthesized? Explain its properties and mention the applications.

B. i) Explain the structural properties of chain silicates.

ii) What are zeolites. Explain any two applications of them.

C. Give reasons;
i) Alkali metals show less tendency to form the complexes than alkaline earth metals.
ii) Acetic acid is the strong acid in liquid ammonia.
iii) Lithium ion has lowest conductivity among the alkali metals though it is the smallest size. **[4+3+3]**

5 A. i) Explain the pyramidal oxidation states of 1st row transition metals.
ii) Explain the separation of lanthanides by valency change method.

B. Compare and contrast the lanthanides and actinides on the basis of oxidation states and complex formation.

C. i) Write an explanatory note on amorphous allotropes of carbon.
ii) Why are lanthanides used for wave length calibration of instruments.
[4+3+3]

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