

Reg. No. :

Name :

Second Semester M.Sc. Degree Examination, November 2021

Chemistry/Polymer Chemistry/Analytical Chemistry

CH/CL/PC 221 : INORGANIC CHEMISTRY – II

(2020 Admission)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **two** among (a), (b) and (c) from each question. Each sub question carries **2** marks.

1. (a) What is the reason for narrow line obtained from solution spectra of Mn^{2+} ion complexes?
- (b) Arrange the following complexes in the increasing order of frequency of maximum absorption in the electronic spectrum.
 $[Ti(H_2O)_6]^{3+}$, $[TiF_6]^{3+}$, $[TiCl_6]^{3-}$, $[Ti(CN)_6]^{3-}$
- (c) Draw the Orgel combined energy level diagram for octahedral and tetrahedral complexes having single electron in d-orbital.
2. (a) What are Miller indices?
- (b) What is Schottky defect?
- (c) Draw the structure of FCC system.

P.T.O.



3. (a) Define the color center of inorganic solids with examples.
 (b) What are insulators?
 (c) What are pyroelectric and ferroelectric effects?
4. (a) Predict the products formed when borazine react with HCl and NaBH₄.
 (b) Write product of the following reaction and mention its important application.

$$[\text{PnCl}_2]_n + 2n\text{NaOCH}_2\text{CF}_3 \rightarrow ?$$

 (c) Complete the following reactions.
 (i) $(\text{CH}_3)_2\text{OBH}_3 + \text{NH}_3 \rightarrow ?$
 (ii) $\text{B}_2\text{H}_6 + 2\text{NH}_3 \rightarrow ?$
5. (a) Why LaI₂, CeI₂ and NdI₂ tend to have nonstoichiometric structure and also have metallic conduction?
 (b) What is your justification for the line like absorption spectra of lanthanide (+III) cations?
 (c) Why pi-back bonding cannot form in lanthanide complexes with CO, CN⁻ and other pi-Lewis acids?

(10 × 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) from each question. Each question carries **2** marks.

6. (a) State Laporte rule. Why Laporte rule is not obeyed by octahedral complexes.
 (b) Why the octahedral complexes of Co²⁺ have the observed value for μ higher than calculated value by the spin only formula? Explain.



7. (a) What are crystal defects? Discuss about point, line and plane defects.
(b) Explain the rotating crystal method of X-ray diffraction method to determine the structure of a crystal.
8. (a) Discuss the doping of semiconductors and its conduction mechanism
(b) Explain superconductivity and photoconductivity with examples.
9. (a) Draw the structure of P_4S_3 , P_4S_5 , P_4S_7 , P_4S_9 , P_4S_{10} .
(b) Discuss about the metallocarboranes.
10. (a) What are the shift reagents and how do they simplify the NMR spectrum?
(b) Discuss the separation of the lanthanide elements by ion exchange methods.

(5 × 5 = 25 Marks)

SECTION – C

Answer any **three** questions. Each questions carries **10** marks

11. Explain the paramagnetic susceptibility measurement of transition metal ions of high and low spin complexes.
12. Discuss about the crystal structure of AX_2 and ABX_3 type compounds.
13. Explain the following terms:
 - (a) Brillouin zones
 - (b) k space
14. (a) Discuss the preparation and properties of borazine and phosphazene compounds.
(b) Explain why the borazine and phosphazene are called as misnomers of benzene?
15. Explain the electronic configuration and oxidation states of lanthanides

(3 × 10 = 30 Marks)

