

Reg. No. :

Name :

First Semester M.Sc. Degree Examination, May 2022

Chemistry/Analytical Chemistry/Polymer Chemistry

CH/CL/PC 211 : INORGANIC CHEMISTRY I

(2020 Admission onwards)

Time : 3 Hours

Max. Marks : 75

SECTION – A

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

1. (a) What is nephelauxetic effect?
 - (b) Arrange the following complex ions in the decreasing order of Δ_0 value: $[\text{Cr}(\text{CN})_6]^{3-}$, $[\text{CrCl}_6]^{3-}$, $[\text{Cr}(\text{NH}_3)_6]^{3+}$ Justify your answer.
 - (c) The ionic radii of M^{2+} ions are expected to decrease smoothly from Ca^{2+} to Zn^{2+} . But the change is not regular. Why?
2. (a) Distinguish between accuracy and precision.
 - (b) What are metallochromic indicators? Give an example.
 - (c) Calculate the coefficient of variation of the following set of data
10.28, 10.24, 10.25, 10.25, 10.30

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3. (a) What are solid electrolytes? Give an example.
(b) Give the materials that can be used for making rechargeable batteries
(c) What are inorganic phosphors?
4. (a) Explain why polymerization stops for isopoly anions?
(b) Define zeolite. What are the different type of secondary building units available in the framework of zeolite?
(c) Describe the structure and bonding in XeF_2 .
5. (a) List the constituents of photochemical smog.
(b) Give any two properties of water significant to environment.
(c) How can we control soil acidity?

(10 × 2 = 20 Marks)

SECTION – B

Answer either (a) or (b) of each question. Each question carries 5 marks.

6. (a) Consider σ -bond formation only, find out the molecular orbitals of a transition metal complex $[\text{ML}_6]$ and draw a tentative molecular orbital energy level diagram. Locate the so-called crystal field splitting bands.
(b) How crystal field stabilization energy helps on predicting lattice energies, enthalpies of hydration and ionic radii of the transition metal based coordination compounds?
7. (a) Outline the principles of complexometric titrations. Discuss how EDTA is used for estimation of zinc.
(b) Discuss the various organic reagents used in gravimetric analysis.
8. (a) Give a brief account of SOFCs.
(b) Discuss the structural aspects of metal nitrides.



9. (a) What are silicones? Discuss their synthesis, structures and applications.
(b) Discuss the preparation and structures of isopolyacids of vanadium.
10. (a) Name any two common air pollutants. What are their hazards?
(b) Give a brief account of hydrological cycle.

(5 × 5 = 25 Marks)

SECTION – C

Answer **any three** questions, each question carries **10** marks

11. With the help of molecular orbital theory and energy level diagram, explain, how the crystal field splitting energy depends on π -acceptor and π -donor ligands?
12. Explain the applications of TG, DTA and DSC in the study of metal complexes
13. (a) Write a note on fullerides.
(b) Give an account of one dimensional metals.
14. What are zeolites? How they can function as microporous materials and molecular sieves?
15. (a) Give an account of the depletion of ozone layer.
(b) Write briefly on redox status of soil.

(3 × 10 = 30 Marks)

