

Reg. No. :

Name :

Second Semester M.Sc. Degree Examination, July 2019

Branch : Chemistry/Polymer Chemistry

CH/CL/CM/CA/PC 221 : INORGANIC CHEMISTRY – II

**(Common for Chemistry (2016 Admission Onwards) and Polymer
Chemistry (2018 Admission))**

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

- (a) What is Polythiazyl? Give its preparation and structure.

(b) What is inorganic graphite? Discuss its preparation and uses.

(c) How is diborane prepared? Give its structure.
- (a) What are term symbols? Derive the term symbols for d^4 and d^8 ions.

(b) Why is $[\text{Mn}(\text{H}_2\text{O}_6)]^{2+}$ faintly coloured?

(c) The magnetic moments of $[\text{Ni}(\text{CN})_4]^{2-}$ and $[\text{Ni}(\text{C}_1)_4]^{2-}$ are zero and 4.2BM, respectively. Why?
- (a) Define (i) unit cell and (ii) space lattice.

(b) When does a crystal said to possess a rotation-inversion axis?

(c) Define imperfections in crystals. What is atomic imperfection?

P.T.O.



4. (a) Correlate the occurrence of +2 and +4 oxidation states of lanthanides with their electronic configurations.
- (b) Lighter actinide ions exhibit broadening of absorption peaks somewhat like the broadening found in transition metal ions. Why?
- (c) What is sillimanite? What are its composition and use?
5. (a) What are k space and Brillouin zones?
- (b) Explain doping with an example.
- (c) What is photovaltic effect? Mention its applications.

(10 × 2 = 20 Marks)

SECTION – B

Answer either **(a)** or **(b)** of **each** question, and each question carries **5** marks.

6. (a) Give one method each for the preparation of P_4S_3 and P_4S_{10} . Discuss their structures and uses.
- (b) State Wade's rules and discuss with examples.
7. (a) What are charge-transfer transitions? Discuss their types and characteristics.
- (b) What do you mean by orbital contribution and quenching of orbital angular moments? In which cases do you expect quenching? Explain with examples.
8. (a) Using suitable examples, explain different close packed structures such as, BCC, FCC and HCP.
- (b) How are colour centers formed? Discuss their characteristics.
9. (a) What is lanthanide contraction? Discuss its consequences.
- (b) What are trans-uranium elements? Comment on their stabilities. What are their uses?



10. (a) What is Missner effect? How are superconductors classified as Type I and Type II? Give examples.
- (b) What is ferroelectric effect? How is it produced? Mention the uses of ferroelectric.

(5 × 5 = 25 Marks)

SECTION – C

Answer any **three** questions, and each question carriers **10** marks.

11. What are cyclophosphazines? Briefly discuss the synthesis, structures and uses of cyclophosphazines with 6-and 8 membered rings.
12. What are Orgel diagrams? How are they constructed? Using specific examples, explain their advantages in interpreting electronic spectra of coordination compounds.
13. Discuss the powder method of X-ray diffraction for crystals structure studies. Show, how 'd' values can be derived from the data.
14. Write notes on:
- (a) Use of lanthanide complexes as shift reagents.
- (b) Extraction of thorium.
15. What are the postulates of band theory of solids? Discuss the refinements made on simple band theory. What are its merits over free electron theory?

(3 × 10 = 30 Marks)

