

Roll No.

(12/24)

15025

M. Sc. EXAMINATION

(For Batch 2021 & Onwards)

(Third Semester)

CHEMISTRY

MSc/Chem/3/DSC3-I

Inorganic Chemistry Special-III

Time : Three Hours

Maximum Marks : 70

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

1. (i) Why is borazine often called "Inorganic Benzene" ?
- (ii) Explain the concept of molecular self-assembly.

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P.T.O.

- (iii) Why does hemoglobin exhibit a sigmoidal oxygen-binding curve while myoglobin does not ?
- (iv) What do you understand by CN and CO poisoning ?
- (v) How is iron absorbed and regulated in the human body ? 2×5=10

Unit I

- 2. (a) What are the methods of synthesizing arsenic sulfides ? Write their applications. 5
- (b) What are borazines ? Give their methods of preparation and chemical reactions. 5
- (c) Discuss the factors that contribute to the ability of elements to undergo catenation. How does catenation vary across different groups in the periodic table ? 5

- 3. (a) How does the intercalation of guest molecules or ions into host structures affect the properties and applications of materials ? Provide examples to illustrate your answer. 7
- (b) Explain the structural features, methods of preparation and chemical reactions of phosphazenes. How do the P-N bonds in phosphazenes differ from typical covalent bonds ? 8

Unit II

- 4. (a) What are the fundamental principles of molecular recognition ? How do these principles guide the design of molecules for selective binding ? 8
- (b) How does multiple recognition work in supramolecular chemistry and what are the advantages of using multiple binding sites in the design of receptors ? 7

5. (a) Describe the design principles behind supramolecular catalysts and how they mimic or differ from natural enzymes in terms of specificity and efficiency. 7
- (b) What are supramolecular devices ? How do they utilize molecular recognition and self-assembly to perform specific functions ? 8

Unit III

6. (a) Draw the structure of Chlorophyll and briefly discuss the photosynthesis process. 7
- (b) Write notes on the following : 8
 - (i) Ferredoxin
 - (ii) Ruberidoxin.
7. (a) Write notes on the following : 8
 - (i) Xanthine Oxidase
 - (ii) Carbonic Anhydrase .
- (b) Describe the role of Vitamin-B₁₂ in the biological system in detail. 7

Unit IV

8. (a) What are essential and trace elements ? Discuss their role in biological systems. 7
- (b) Describe the different types of chelating agents used in chelate therapy, including their chemical properties and specific mechanisms of action. 8
9. Write down the causes, harmful effects and prevention of :
 - (a) Acid Rain 7
 - (b) Particulate pollution. 8