

D1ACH2202

(2 Pages)

Name.....

Reg.No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2022

(Regular/Improvement/Supplementary)

CHEMISTRY

FCHE1C02-ELEMENTARY INORGANIC CHEMISTRY

Time: 3 Hours

Maximum Weightage: 30

**Section A: Short answer questions. Answer any *eight* questions. Each carries *one* weightage.**

1. State and explain octet rule.
2. Explain why oxygen and fluorine do not participate in hypervalency.
3. What are metallocarboranes? Give an example.
4. Arrange  $\text{BF}_3$ ,  $\text{BI}_3$ ,  $\text{BBr}_3$  and  $\text{BCl}_3$  in the increasing order of acid strength. Justify your answer.
5. Write a note on diagonal relationship.
6. What is inorganic benzene? Compare its structure with that of benzene.
7. Give a short note on Q-value of nuclear reaction?
8. What is Zeolite? Describe the use of zeolites as water softeners.
9. What are methanides? Give an example.
10. What are Phosphazenes? Draw the structure of hexachlorocyclotriphosphazine.
11. Write the synthesis of any two uranyl compounds.
12. What happens when  $\text{S}_2\text{Cl}_2$  reacts with  $\text{NH}_3$  either in solution in an inert solvent or heated over solid ammonium chloride?

(8 x 1 = 8 weightage)

**Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage.**

13. Discuss briefly the different types of hydrogen bonding and its consequences.
14. Isoelectronic molecules are isostructural. Illustrate this statement with examples.

(P.T.O.)

15. Arrange the following compounds in the increasing order of basicity both in gas phase and solution phase. Substantiate your answer.



16. What are Wade's rules? How these rules help in elucidating the structures of boranes?

17. Derive the Styx code for the compound  $\text{B}_4\text{H}_{10}$  and draw its structure.

18. Comment on the spectral and magnetic properties of actinide elements compared to lanthanides.

19. Give major differences between Geiger-Muller counter and Scintillation counters.

**(4 x 3 = 12 weightage)**

**Section C: Essay questions. Answer any two questions. Each carries five weightage.**

20. Discuss the synthesis, structures and chemical properties of  $\text{S}_4\text{N}_4$  and  $\text{S}_2\text{N}_2$ .

21. Write notes on Heteropoly, Isopoly acids of W and Mo and its applications.

22. a) Write notes on neutron activation analysis.

b) What is nuclear reaction cross section? Give the relation between reaction cross-section and reaction rate. Explain.

23. Discuss the important chemical reactions that occur in liquid  $\text{NH}_3$ , HF and  $\text{HSO}_3\text{F}$ .

**(2 x 5 = 10 weightage)**