D 114539 **(Pages : 2)** **Name.....**

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2024

(CBCSS)

Chemistry

CHE 1C 02—ELEMENTARY INORGANIC CHEMISTRY

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Section A

Answer any **eight** *questions.*
Each question carries a weightage of 1.

1. Explain Usanovich concept of acids and bases.
2. Arrange the following species in the increasing order of acidity and give reasons for your answer.

   $\left[Fe(H_2O)_6\right]^{3+}$, $\left[Fe(H_2O)_6\right]^{2+}$ and $\left[Al(H_2O)_6\right]^{3+}$.

3. What is the action of diborane on :
   a) CO b) dimethylether
4. Classify the following compounds into *Closo*, *Nido* and *Arachino* structures :
   a) B_6H_{12}. b) B_5H_9.
   c) B_5H_{11}. d) $C_2B_{10}H_{12}$.
5. What are sheet silicates ? Give two examples.
6. Account for the water-repellent nature of silicones.
7. What are Ellingham diagrams ? Account for the abrupt changes in these diagrams ?
8. What are super heavy elements ? How are they produced ?
9. Explain the nuclear fusion reactions taking place in sun.
10. Bring out the principle involved in the working of TEM.

(8 × 1 = 8 weightage)

Turn over

Section B

Answer any **six** *questions.*
Each question carries a weightage of 2.

11. Comment on the levelling effect of solvents with suitable examples.
12. Give a brief account of the sandwich type metallocarboranes.
13. Give an account of the classification of carbides, giving examples.
14. Write a note on trans-actinide elements.
15. Discuss the principle involved in neutron activation analysis.
16. Describe the theory and working of AFM.
17. How is graphene synthesised ?
18. Write briefly on the isopoly anions of W and Mo.

(6 × 2 = 12 weightage)

Section C

Answer any **two** *questions.*
Each question carries a weightage of 5.

19. Discuss the acid-base reactions and precipitation reactions in liquid ammonia as a solvent. What are the advantages and disadvantages of using liquid ammonia as a solvent.
20. How do you prepare the different isomers of dicarba-*closo*-dodecaborane(12) ? Comment on the acidity of the different types of hydrogen atoms present in carboranes.
21. Describe the synthesis of $(NPCl_2)_3$. How is it converted into phospham ? Discuss the structure and bonding in this compound.
22. Explain the principle of a nuclear reactor. Write briefly on radiation protection and radioactive waste disposal in an atomic power plant.

(2 × 5 = 10 weightage)