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Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2023

(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. Distinguish between Lewis concept and Lux-Flood concept of acids and bases.
2. Arrange the following complex species in the increasing order of acid strength and substantiate your answer.

   $\left[Cr(H_2O)_6\right]^{3+}$, $\left[Fe(H_2O)_6\right]^{3+}$, $\left[Co(H_2O)_6\right]^{3+}$ and $\left[V(H_2O)_6\right]^{3+}$.
3. Arrange the different types of hydrogen atoms present in carboranes in the increasing order of acidity. Give reasons for your answer.
4. Using Wade's rule, classify the following compounds into *closo*, *nido*, *arachno* and hypo boranes :

   a) B_4H_{10} b) $C_2B_3H_5$ c) B_5H_{11} and d) $C_2B_3H_5Fe(CO)_3$
5. How does polythiazyl behave as 'one dimensional metal' ?
6. How is triphosphonitrilic chloride converted into phospham ?
7. What are super heavy elements ? How are they produced ?
8. The ratio between atoms of two radioactive elements A and B at equilibrium was found to be $3.1 \times 10^9 : 1$. If half-life period of A is 2×10^{10} years, what is the half-life period of B ?
9. Write a note on stellar energy.
10. How do carbon nanotubes differ from fullerenes ?

(8 × 1 = 8 weightage)

Turn over

Section B

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

11. What is Symbiosis ? Explain with examples.
12. How is S_4N_4 prepared ? Discuss its structure and properties.
13. Give an account of the classification of silicates.
14. What are Latimer and Frost diagrams ? Discuss their applications.
15. Describe the working principle of a GM counter.
16. Discuss the bottom-up and top-down approaches for the synthesis of nanomaterials.
17. Discuss the principle and applications of XPS.
18. Give an account of the synthesis and structure of $(NPCl_2)_3$.

(6 × 2 = 12

Section C

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

19. Discuss the HSAB concept of acids and bases. Explain with suitable examples. How predicts the co-ordination of ambidentate ligands.
20. How are B- and N- substituted borazines prepared ? Give an account of the structure in borazine. Compare its reactivity with that of benzene.
21. Give an account of the heteropoly and isopoly anions of W and Mo.
22. Elaborate the principle and instrumentation of neutron activation analysis. Mentio and demerits.

(2 × 5 = 10