143853

D 13103

(Pages : 2)

Name.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2021

(CBCSS)

Chemistry

CHE 1C 02—ELEMENTARY INORGANIC CHEMISTRY

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.*
4. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A

Answer any **eight** *questions.*

Each question carries a weightage of 1.

1. All Bronsted bases may not be Arrhenius bases. Substantiate this statement with suitable example.
2. Classify the following into *closo/nido/arachno* structures :

   a) $[B_{12}H_{12}]^{2-}$. b) CB_8H_{12}.

   c) $C_2B_{10}H_{12}$. d) B_4H_{10}.
3. How is polythiazyl prepared ? Comment on the metallic property of this compound.
4. Aluminium can reduce FeO to Fe below 1500°C ; but aluminium will not reduce MgO to Mg below 1500°C. Give reasons.
5. What is the significance of nuclear reaction cross section ?
6. Distinguish between SEM and TEM.
7. 'Bases that are weak in water may appear stronger in more strongly proton donating solvent'. Substantiate this statement with an example.

Turn over

8. Arrange the different types of hydrogen atoms present in carboranes in the increasing order of acidity. Justify your answer.

9. Bring out the reasons for water repellent nature of silicones.

10. What information do we get from Latimer diagram ? Explain.

(8 × 1 = 8 weightage)

Section B

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

11. Explain leveling effect of solvents with suitable examples.

12. How is tetrasulphur tetranitride prepared ? Give its structure. Comment on the thermochromism exhibited by this compound.

13. How is 1, 2-dicarba-*closo*-dodecaborane(12) prepared ? What happens when it is heated ?

14. Write briefly on the heteropoly and isopoly anions of Mo.

15. Explain how energy is produced in the sun and stars.

16. Explain with suitable examples, the bottom up and top-down approaches for the synthesis of nanomaterials.

17. How XRD is useful in the characterization of nanomaterials ?

18. Compare the differences between 4f and 5f orbitals and the consequences of these on the properties of lanthanides and actinides.

(6 × 2 = 12 weightage)

Section C

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

19. Discuss the theoretical basis of classifying acids and bases as 'hard' and 'soft'. Comment on the chemical consequences of this concept in the study of coordination compounds.

20. a) Discuss the importance of icosahedral frame work of boron atoms in boron chemistry.

    b) Write a note on sandwich type metallocarboranes. (3 + 2 = 5 marks)

21. Write an account on the classification of silicates based on their structure giving examples. Discuss the consequences of isomophous substitution in silicates.

22. Outline the theory and experimental setup involved in neutron activation analysis. Comment on the merits and demerits of this technique.

[2 × 5 = 10 weightage)