F 4678 (Pages : 2) Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, JANUARY 2017

Third Semester

Faculty of Science

Branch III : Chemistry

AN3 C09/CH3 C09/PO3 C09—STRUCTURAL INORGANIC CHEMISTRY

(Common to M.Sc. Analytical Chemistry, Chemistry and Polymer Chemistry)

[2012 Admission onwards]

Time : Three Hours Maximum Weight : 30

Section A

Answer any **ten** *questions.*
Each question carries a weight of 1.

1. What is meant by sintering ?
2. The Styx number of B_4H_{10} is (4012). Draw its topological structure.
3. Define piezoelectricity. Describe one application of piezoelectric crystals.
4. What is luminescence ?
5. Briefly explain the structure of Illmenite.
6. What do you mean by Cooper pairs ?
7. Give *two* examples of isopoly anions of Vanadium.
8. What are Zeolites? Mention their uses.
9. What are ceramic materials ? Differentiate between traditional and advanced ceramics.
10. Explain the magnetic properties of garnets.
11. What are Spinels ?
12. Explain the superconductivity of carbon nanotubes.
13. State and explain Wades rule.

(10 × 1 = 10)

Section B

Answer any **five** *questions.*
Each question carries a weight of 2.

14. What are safety glasses and fiber glasses ? How are they made? What are their important uses ?
15. Explain the BCS theory of superconductivity ?
16. Write a brief account of cage like structures of phosphorous ?
17. Describe the structure and bonding in borazines.

Turn over

18. Explain Schottky defect. Derive an expression for the number of Schottky defects in a crystal ?
19. Describe in details the free electron model of metallic structure.
20. Briefly explain the kinetics of phase transitions in solids.
21. Write note on phosphate in biological systems.

(5 × 2 = 10)

Section C

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

22. (a) Give an account of the structure of silicates.
    (b) Explain the structure and bonding in Poly phosphazenes.
23. (a) How is $[Re_2Cl_8]^{2-}$ Synthesized ? Explain the characteristics features in bonding. Mention the evidence of M-M bond in it.
    (b) What is ceramic processing ? Illustrate the use of sol gel method in ceramic processing.
24. (a) Describe the structure of compounds of :
        (i) AX (Zinc blende, Wurtzite).
        (ii) AX_2 (Rutile, Fluorite, antiflourite).
    (b) Briefly explain the Zone theory.
25. Give a brief account of the optical and electronic properties of metals.

(2 × 5 = 10)