

SECTION C – (5 x 10 = 50 marks)

ANSWER ALL QUESTIONS

21. A Distinguish between the structure and properties of benzene and borazine. Explain with suitable evidences.

OR

- B Explain the structural features of Borane clusters. Apply Wade's rule in predicting the structure of Boranes.

22. A Examine the different types of crystal structures based on seven basic crystal systems and Bravais lattices.

OR

- B Criticize on the following statements.

- i) LiF has higher lattice energy than LiI.
- ii) Hydration energy of Na is greater than that of K.
- iii) Cubic system has the greatest symmetry whereas triclinic system has the least.

23. A Explain the structural features of rock salt and wurtzite.

OR

- B Illustrate the principle of sol-gel method for crystal growth and explain in advantages and disadvantages.

24. A With a neat sketch explain the theory, principle and instrumentation on SEM.

OR

- B Explain the application of Bragg's law in the interpretation of XRD data.

25. A Distinguish between Schottky and Frenkel defects, metal excess and deficient defects.

OR

- B Summarize the salient features of Band theory and its application in conductors, insulators and semi-conductors.

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END SEMESTER EXAMINATION NOV/DEC-2023

**First Semester
M.Sc CHEMISTRY**

**CORE COURSE – II STRUCTURE AND BONDING IN INORGANIC
COMPOUNDS**

Time: Three Hours

Maximum: 75 marks

SECTION A – (15 x 1 = 15 marks)

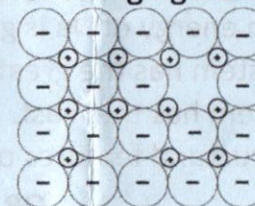
ANSWER ALL QUESTIONS

- The discrete unit in orthosilicate is _____.
A SiO_4^{4-} B $\text{Si}_2\text{O}_7^{4-}$
C SiCl_2 D $\text{Si}_2\text{O}_5^{2-}$
- Structure of a carborane with formula, $\text{C}_2\text{B}_4\text{H}_8$ is formally derived from _____.
A Closo-borane B Archano-borane
C Nido-borane D Conjuncto-borane
- Number of lone pairs in XeOF_4 is _____.
A 3 B 2
C 1 D 0
- The number of lattice points in a primitive cell is _____.
A 1 B 2
C 3 D 4
- The number of tetrahedral holes for each atom within the FCC lattice is _____.
A 0 B 2
C 4 D 6

6. Using wade's rules predict the structure type of $C_2B_5H_7$.
- A nido B closo
C arachna D hypho
7. Which of the following compounds is expected to have the highest lattice energy?
- A NaCl B NaBr
C MgF_2 D None of the above
8. In the Wurtzite structure, there is a ___ array of Sulphide anions.
- A bcc B fcc
C sc D hcp
9. The position of cations and anions are interchangeable in _____ and _____ structures.
- A zinc blende and rock salt B fluorite and antifluorite
C diamond and graphite D rutile and CsCl
10. When a cation leaves its normal position in the crystal and moves to some interstitial space, the defect in the crystal is known as _____.
- A Non-stoichiometric defect B Frenkel defect
C F-centre D Schottky defect
11. The crystals having F-Centres are irradiated with light, they become _____.
- A photoconductor B electric conductor
C n-type semiconductor D p-type semiconductor
12. Diffraction results as the distance between the scattering centres are of the _____ order of magnitude as the radiation

wavelength.

- A greater B lesser
C same D negative
13. The atomic and/or magnetic structure of a material can be determined by _____.
- A neutron diffraction B Electron Diffraction
C X-Ray Diffraction D Fourier synthesis
14. What is the disadvantage of using a solution growth method for the growth of the crystals?
- A Simple apparatus B Isothermal conditions
C Rapid growth rates D Slow growth rates
15. Which defect does the following figure depict?



- A Vacancy defect B Frankel defect
C Schottky defect D Interstitial defect

SECTION B – (2 x 5 = 10 marks)

ANSWER ANY TWO QUESTIONS

16. Evaluate various silicates with layer structures.
17. Appraise the unit cell of NaCl through a neat sketch and examine its lattice points and crystal lattice.
18. Explain the normal and inverted type structure in spinels.
19. Utilize electron diffraction method for crystal structure determination.
20. Construct a flow chart describing different types of imperfections present in the crystalline solids.