Department: SCIENCE   **Class: BSc SEM-1**

Question Bank- CHEMISTRY-1

Paper Code & Name of Paper: CHM-5IT-101: Structure-bonding, Mathematical concepts, and States of matter

Short answer type questions

1.   At what temperature does the volume of any gas become zero?

2.   Write down the values of Avogadro's number (N) and ideal gas constant (R)

3.   Which of the two graphs will be a straight line at the constant temperature, P versus V or P versus I/V.

4.   Define the most probable velocity.

5.   What is the van der Waal's volume correction and pressure correction?

6.   What is excluded volume?

7.   Define radius ratio in ionic solids

8.   Define lattice energy

9.   What is the crystal structure of NaCl?

10.   Name two semiconductors containing F -centers

11.   Draw the shape of the NH_3 molecule

12.   What is transition temperature?

13.   Define point group

14.   Define the center of symmetry

15.   Define unit cell

16. Draw the (222) plane for a cubic crystal

17. What is Bragg's equation

18. What is isotropy?

19. What is the crystal structure of CsCl?
20. Define Boyle's temperature

Long Answer Type Questions

1. Explain the following
    (a) Frenkel
    (b) Schottky Defects
    (c) Solubility of alkaline earth metal sulphates decreases in the order
       $MgSO_4 > Ca\ SO_4 > SrSO_4 > BaSO_4 >$

2. Discuss in brief:
    (a) Band theory by taking the example of Lithium Metal
    (b) Write Fajan's Rule
    (c) Hydrogen Bonding

3. Explain
    (a) What is VSEPR theory? Different rules of VSEPR theory
    (b) Structure of SF_4 on the basis of VSEPR theory

4. Write down bond order and number of unpaired electrons of each species
    (a) O_2, O_2^+, O_2^-, O_2^{-2}
    (b) Why is the dipole moment of NH_3 much higher than NF_3?

5. Answer the following
    a) Prove log 96=5log2+ log3
    b) Find out the values of the following factorials
        2!,6! And 9!
    c) What is the value of 0!

6. How the liquid crystals are classified? Explain

7. (a) What are the main postulates of the kinetic theory of gases?
    (b) Derive Kinetic gas equation

8. Explain the following
    a) Critical phenomenon and critical constant
    b) Prove that $RTc/PcVc = 8/3$ where Pc, Vc and Tc are critical constants

9. (a) Define the law of rational indices
    (b) What is law of symmetry.
    (c) Symmetry elements in crystals

10. (a) Derive Bragg's Equation for crystals
     (b) Discuss the crystal structure of CsCl

11. Explain the following:
     (a) Elastic and non-elastic gel
     (b) Electro Osmosis
     (c) Electrophoresis

12. Describe
     (a) The methods for the preparation of colloidal solution
     (b) Hardy and Schlze's law for coagulation of lyophobic colloids

13. Write short notes on

     (a) Space lattice and unit cell
     (b) Elements of Symmetry

14. Write short notes on

     a) Intermolecular forces

     b) Eyring theory of crystal

15.   Write a short note on
     a) What do you mean by liquid crystals?
     b) What is the difference between Nematic liquid crystals and
        Smectic liquid crystals?

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