QP Code: U25B015

Reg. No : .....

Name : .....

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

II SEMESTER (FYUGP) DEGREE EXAMINATION, MARCH 2025

B Sc Chemistry

CHE2CJ101 : PHYSICAL CHEMISTRY I : STATES OF MATTER

2024 Admission Onwards

(Credits: 4)

Time: 2 Hours **Maximum Marks: 70**

Section A

*Answer **all**. Each question carries **3** Marks* ***(Ceiling: 24 Marks)***

1. Give the significance of van der Waals constants. [BTL1]
2. At what temperature will the RMS velocity of O_2 gas be equal to that of H_2 molecules at 300 K? [BTL1]
3. With help of an example explain superhydrophobic surfaces. [BTL3]
4. Give the Poiseuille equation and mention the terms involved in it. [BTL2]
5. Calculate the number of atoms in a body centred cubic unit cell of a metallic crystal. [BTL3]
6. State and explain Bragg's equation. [BTL2]
7. What is electron diffraction by crystals? [BTL3]
8. TiO_2 has an extremely high melting and boiling point justify. [BTL2]
9. What are aerosols? [BTL1]
10. What are interstitial solid solutions ? [BTL1]

Section B

*Answer **all**. Each question carries **6** Marks* ***(Ceiling: 36 Marks)***

11. Find the critical constants for HCl gas, a = 0.367 Nm^4mol^{-2} and b = 4.08 x 10^{-5} m^3mol^{-1}. [BTL2]
12. Give Maxwell's equation for the distribution of molecular velocities. Also explain graphically the effect of temperature on this distribution. [BTL1]
13. Derive van der Waals equation in virial form and deduce Boyle Temperature from this equation. [BTL2]

Turn Over

14. Explain dipole-dipole and dipole-induced dipole interactions. [BTL5]

15. Discuss the various types of molecular interactions. [BTL3]

16. Discuss atomic and molecular solids. [BTL4]

17. Suggest a law describing solubility of gases in liquids with its applications. [BTL5]

18. What are colligative properties? Mention any two. [BTL3]

Section C

*Answer **any one**. Each question carries **10** Marks* ***(1x10=10 Marks)***

19. Derive the van der Waals equation for a real gas. [BTL4]

20. Define the term Ebullioscopic constant? What is the relationship between freezing point depression and molar mass determination for solutes? [BTL3]

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