

QP CODE: D2BCH2501	(Pages: 2)	Reg. No :
		Name :
SECOND SEMESTER FYUGP EXAMINATION, APRIL 2026 (Regular/Improvement/Supplementary) Discipline Specific Core (DSC) Courses - Major CHE2CJ101 : Physical Chemistry - I : States of matter (Credits: 4)		
Time: 2 Hours	Maximum Marks: 70	
Section A		
Answer the following questions. Each carries 3 marks (Ceiling: 24 marks)		
1. Derive an expression for root mean square velocity from kinetic gas equation.	BL1	CO1
2. "H ₂ O exist in liquid state whereas H ₂ S exist in gaseous state". Justify the statement.	BL1	CO3
3. Write a short note on crystalline solids.	BL1	CO4
4. What are colligative properties? Give two examples.	BL2	CO6
5. How does the distance between molecules affect the strength of dipole-dipole interactions?	BL2	CO3
6. Define the terms mean free path and collision diameter. How are they related?	BL2	CO1
7. Calculate the freezing point of a solution prepared by dissolving 3.42 g of sucrose (molar mass = 342 g mol ⁻¹) in 50 g water. K _f = 1.86 Kkgmol ⁻¹ ; freezing point = 273 K.	BL2	CO6
8. Discuss the powder pattern of fcc crystal.	BL2	CO5
9. Define the terms osmosis and osmotic pressure.	BL1	CO6
10. Explain the term average velocity.	BL2	CO1
(PTO)		

Section B

Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)

11.	The van der Waals constants for Cl_2 are : $a = 0.6579 \text{ Nm}^4\text{mol}^{-2}$ and $b = 5.62 \times 10^{-5} \text{ m}^3\text{mol}^{-1}$. Assuming that Cl_2 behaves as a van der Waals gas, calculate its critical constants.	BL2	CO1
12.	Explain the term viscosity with regard to liquids and also explain the dependence of viscosity on the strength of intermolecular forces in liquids. Explain the variation of viscosity of a liquid with temperature.	BL2	CO3
13.	Compare and contrast the powder diffraction pattern of NaCl and KCl crystals.	BL1	CO5
14.	Derive an expression for determining the molecular mass of a solute using depression in freezing point.	BL2	CO6
15.	Explain Tyndall effect. Give one application of the phenomenon.	BL2	CO6
16.	Distinguish between superhydrophilic, superhydrophobic and hydrophilic surfaces using angle of contact measurements.	BL2	CO3
17.	Discuss hexagonal close packing and cubic close packing in crystals with examples.	BL1	CO4
18.	Compare and contrast the arrangement of particle in simple cubic, bcc and fcc lattices.	BL2	CO4

Section C

Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)

19.	Derive the van der Waals' equation for a real gas.	BL2	CO1
20.	State and explain Henry's law. What are its limitations? Discuss any two applications.	BL2	CO6

CO : Course Outcome

BL : Bloom's Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)