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

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Chemistry Degree Examination, April 2025

CHE2CJ101 – Physical Chemistry – I : States of Matter

(FYUGP 2024 Admission)

Time: 2 hours

Max. Marks : 70

PART – A

All questions can be attended.
Each question carries **Three** mark.
Ceiling -24 Marks

		COs	Knowledge Level(KL)	Marks
1	Explain the terms (i)RMS velocity and (ii) most probable velocity for a gas	1	U	3
2	What is supercritical CO_2? Give one of its applications.	1	U	3
3	How do the parameters a and b in the equation of state relate to the critical pressure (Pc) and critical temperature (Tc)?	1	U	3
4	Define coefficient of viscosity. Write down its SI and CGS units?	2	U	3
5	Determine the Weiss indices of the crystal plane with Miller indices (2, 1, 1).	4	AN	3
6	Explain why crystal diffract X-rays?	5	U	3
7	Can you explain the difference between a Bravais lattice and a crystal structure?	4	U	3
8	Draw the vapour pressure-composition curve for a binary solution obeying Raoult's law under all conditions of temperature and concentration.	2	U	3
9	Define ebullioscopic constant.	2	U	3
10	At what temperature will a 0.2 molal solution of sucrose boil if K_B of water is 0.52 $Kkgmol^{-1}$. [Boiling point of water = 373 K].	6	AP	3

PART – B
All questions can be attended.
Each question carries **six** marks.
Ceiling -36 Marks

		COs	Knowledge Level(KL)	Marks
11	Discuss Maxwell-Boltzmann distribution of molecular velocities.	1	U	6
12	Calculate the Pressure for a gas of Volume 1 m³, with the following conditions: n = 2 moles, T = 300K, a = 3.5Pa·m⁶/mol², b = 0.042m³/mol.	1	AP	6
13	Derive Vander walls equations of state.	1	U	6
14	Account for the following facts: (i) Water spreads on glass while mercury remains as a drop: (ii) Water exhibits capillary rise while mercury exhibits capillary fall.	3	AN	6
15	How do the structural transitions in TiO_2 impact its optical, electrical, and photocatalytic properties?	4	U	6
16	Derive the ratio $d_{200}:d_{110}:d_{222}$ for a bcc lattice	4	U	6
17	Derive Bragg's law.	5	U	6
18	Discuss the crystal structure of NaCl.	5	U	6

PART - C
Answer any *one* questions.
Each question carries **Ten** marks.

		COs	Knowledge Level(KL)	Marks
19	(i) Describe the principle of determining molar masses of non-volatile solutes from boiling point elevation measurements. (ii) Explain any two applications of reverse osmosis.	6	U	10
20	a)Discuss the determination of critical constants of a gas b) Calculate the critical temperature of n-hexane which has a boiling point of 341.9 K.	1	AP	10

1 x 10 = 10 Marks

Reg. No:.............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Physics Degree Examination, April 2025

CHE2MN101 – Quantum Mechanics, Solid State & Gaseous State

(FYUGP 2024 Admission)

Time: 2 hours

Max. Marks : 70

PART – A

All questions can be attended.
Each question carries **Three** mark.
Ceiling -24 Marks

		COs	Knowledge Level(KL)	Marks
1	Write the operator postulate in quantum mechanics. Give two examples of quantum mechanical operators.	CO1	R	3
2	Write down the Schrodinger equation of simple harmonic oscillator. Explain the terms involved.	CO1	R	3
3	Briefly discuss the concept of spin quantum number	CO1	U	3
4	How do crystalline solids differ from amorphous solids?	CO2	U	3
5	Deduce the relation between mean free path and coefficient of viscosity.	CO3	An	3
6	Define the term collision diameter.	CO3	R	3
7	State the virial equation of state and obtain the expression for Boyle temperature.	CO4	R	3
8	Give the relationships connecting van der Waals' constants and the critical constants of a gas	CO4	R	3
9	Mention the significance of the van der Waals' constants 'a' and 'b'?	CO4	U	3
10	Explain the term compressibility factor.	CO4	U	3

PART – B
All questions can be attended.
Each question carries **six** marks.
Ceiling -36 Marks

		Cos	Knowledge Level(KL)	Marks
11	Give a brief account of the quantum numbers n, l and m.	CO1	U	6
12	Derive time-independent Schrodinger equation	CO1	An	6
13	Discuss the stoichiometric defects found in crystals.	CO2	U	6
14	Give a brief account of the classification of solids based on magnetic properties.	CO2	U	
15	Differentiate between Weiss and Miller indices. Calculate the Miller indices of a plane which makes the intercepts ½ aon X-axis, ½ b on Y-axis and goes parallel to the Z-axis.	CO2	An	6
16	Give the relationship between RMS velocity, average velocity and most probable velocity of a gas at a given temperature.	CO3	R	6
17	Using van der Waals' equation, calculate the pressure exerted by 1 mol of a gas enclosed in 1.5 dm3 flask at 400 K. a = 3.0 atmdm6mol-2; b = 0.05 dm3mol-1.	CO4	Ap	6
18	Outline the causes for the deviations of real gases from ideal behavior?	CO4	U	6

PART - C
Answer any **one** questions.
Each question carries **Ten** marks.

		COs	Knowledge Level(KL)	Marks
19	Solve Schrodinger equation for particle in a one dimensional box and obtain the expression of energy. Comment on the quantization of energy levels.	CO1	An	10
20	Discuss the postulates of kinetic theory of gases.	CO3	U	10

1 x 10 = 10 Marks

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Zoology Degree Examination, April 2025

CHE2MN103 – Physical Properties of Solution , Gases & Colloids

(FYUGP 2024 Admission)

Time: 2 hours   Max. Marks : 70

Course Outcome Mapping Scheme

Q.NO	1	2	3	4	5	6	7	8	9	10
COS	CO3	CO3	CO3	CO1	CO1	CO1	CO1	CO1	CO1	CO5
Q.NO	11	12	13	14	15	16	17	18	19	20
COS	CO4	CO2	CO1	CO2	CO1	CO1	CO5	CO5	CO3	CO5

PART – A
All questions can be attended.
Each question carries **Three** mark.
Ceiling -24 Marks

1. How does Henry's law explain the solubility of gases in liquids?

2. Mention the significance of the Van't Hoff factor in colligative property calculations.

3. Differentiate between ideal and non-ideal solutions with an example.

4. Define mean free path and explain its significance in gas behaviour.

5. Define collision number.

6. Give the concept of collision diameter.

7. Define the compressibility factor and explain its significance in real gases.

8. Write the van der Waals equation of state and explain the correction terms.

9. What are critical constants?

10. Explain Brownian movement.

PART – B
All questions can be attended.
Each question carries **six** marks.
Ceiling -36 Marks

11. Describe the significance of reverse osmosis in water purification and desalination.

12. State and explain Raoult's law. How is it used to determine the relative lowering of vapor pressure?

13. Explain the significance of Maxwell's distribution of molecular velocities in the gaseous state.

14. What is viscosity of gases? How does it change with temperature and pressure?

15. Explain the concept of PV isotherms of real gases and how they differ from ideal gas isotherms.
16. Discuss the significance of the critical phenomena and their importance in understanding the behavior of gases.
17. Discuss in detail about the applications of colloids.
18. Define the Gold number and explain its significance in colloidal stability.

19. Explain colligative properties in detail with suitable examples, and discuss their role in real-life applications.
20. Write a detailed note on various properties of colloids, including optical, kinetic, and electrical properties. Discuss their significance and applications in different fields.

$(1 \times 10 = 10 \text{ Marks})$

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Botany Degree Examination, April 2025

CHE2MN105 – Solutions and Surface Chemistry

(FYUGP 2024 Admission)

Time: 2 hours   Max. Marks : 70

PART – A

All questions can be attended.

Each question carries **Three** mark.

Ceiling -24 Marks

		COs	Knowledge Level(KL)	Marks
1	Define surface tension.	1	U	3
2	State Henry's law and give one practical application.	1	U	3
3	Differentiate between ideal and non-ideal solutions with an example.	1	U	3
4	Define lyophilic and lyophobic colloids with one example each.	3	R	3
5	What is Brownian movement?	3	U	3
6	What are emulsions? Give one example.	3	U	3
7	State Freundlich's adsorption isotherm.	4	U	3
8	Explain Hardy-Schulze rule.	3	U	3
9	Explain the basic principle of solvent extraction.	4	U	3
10	What is the Retention Factor (Rf value) in chromatography? Mention its significance.	4	U	3

PART – B

All questions can be attended.

Each question carries **six** marks.

Ceiling -36 Marks

		COs	Knowledge Level(KL)	Marks
11	State and explain Raoult's law. How is it used to determine the relative lowering of vapor pressure?	1	U	6
12	Discuss the significance of colligative properties in determining the molecular weight of a solute.	2	U	6
13	Discuss in detail the applications of colloids.	3	U	6

14	Define Gold number and explain its significance in colloidal stability.	3	U	6
15	Explain the assumptions and significance of Langmuir's adsorption isotherm.	4	U	6
16	Compare and contrast homogeneous and heterogeneous catalysis with suitable examples.(3) Mention any 3 characteristics of catalysed reactions.(3)	4	U	6
17	Explain Thin Layer Chromatography (TLC) with its principle. Mention one advantage of TLC over paper chromatography.	4	U	6
18	Explain the working principle of Gas Chromatography and its applications	4	U	6

PART - C
Answer any *one* questions.
Each question carries **Ten** marks.

		COs	Knowledge Level(KL)	Marks
19	Explain the concept of osmotic pressure and derive the equation for osmotic pressure. How is osmotic pressure used in determining molecular mass?	1	AN	10
20	i)Illustrate enzyme catalysis with an example.(2) ii)Summarise the characteristics of enzyme catalysis. (5) iii)Write down Michaelis Menten equation and explain the term. Explain the significance of Michaelis constant. (3)	4	U	10

1 x 10 = 10 Marks

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Degree Examination, April 2025

CHE2FM106 – Chemistry in daily Life

(FYUGP 2024 Admission)

Time: 1.5 hours   Max. Marks : 50

PART – A
All questions can be attended.
Each question carries **Two mark**.
Ceiling -16 Marks

		COs	Knowledge Level(KL)	Marks
1	Explain pharmacophore with examples.	CO6	U	2
2	What are antihistamines? Give two examples.	CO6	R	2
3	Differentiate between vanishing cream and cold cream.	CO5	An	2
4	Mention advantages of detergents over soap?	CO4	U	2
5	Name the common sources of Vitamin A. Give two deficiency manifestations of Vitamin A.	CO1	R	2
6	Define NPK value.	CO3	R	2
7	Give two examples for insecticides and rodenticides.	CO3	R	2
8	What are Antiperspirants?	CO5	U	2
9	Define the term pharmacodynamics.	CO6	R	2
10	Mention the harmful effects of Toothpaste.	CO5	U	2

PART – B
All questions can be attended.
Each question carries six marks.
Ceiling -24 Marks

		COs	Knowledge Level(KL)	Marks
11	Write a short note on the application of dyes.	CO5	U	6
12	Explain Sex hormones with examples and their functions.	CO1	U	6
13	Briefly explain the mode of action of cyanide poison.	CO2	U	6
14	Analyse pesticide pollution impact on environment.	CO3	An	6
15	List out the general ingredients of shampoos. Mention their functions.	CO4	R	6

PART - C
Answer any *one* questions.
Each question carries Ten marks.

		COs	Knowledge Level(KL)	Marks
16	What are Dyes? Give their requirements and explain classification of dyes based on the mode of application to the fabrics.	CO5	U	10
17	Explain the classification and characteristics of enzymes with examples.	CO1	U	10

1 x 10 = 10 Marks