

25U211

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Name :

Reg. No :

SECOND SEMESTER UG DEGREE EXAMINATION, APRIL 2026

(FYUGP)

(Regular/Supplementary/Improvement)

CC24UCHE2MN104 - STATES OF MATTER AND NUCLEAR CHEMISTRY

(Chemistry - Minor Course)

(2024 Admission onwards)

Time: 2.0 Hours

Maximum: 70 Marks

Credit: 4

Part A (Short answer questions)

Answer *all* questions. Each question carries 3 marks.

1. Explain the effect of temperature on the viscosity of a gas. [Level:2] [CO1]
2. Give the kinetic gas equation and explain the terms. [Level:2] [CO1]
3. Explain the term viscosity of gases. [Level:2] [CO1]
4. Explain the deviation of real gases from ideal gas behavior. [Level:2] [CO2]
5. Explain critical pressure of gas. [Level:2] [CO2]
6. Explain the two applications of liquid crystals. [Level:2] [CO3]
7. State and explain Henry's law. [Level:2] [CO3]
8. Explain smectic liquid crystals. Give one example. [Level:2] [CO3]
9. Recall the term nuclear forces? What are the different types? [Level:2] [CO4]
10. Explain the term radioactive tracer. [Level:2] [CO4]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

Answer *all* questions. Each question carries 6 marks.

11. Calculate the RMS velocity, average velocity and most probable velocity for N_2 molecules at 273 K. [Level:3] [CO1]
12. How does mean free path vary with pressure and temperature? [Level:2] [CO1]
13. Describe virial equation of state and explain the terms. [Level:2] [CO2]
14. Discuss the relation between Boyle temperature and critical temperature. [Level:2] [CO2]

15. Explain the term negative deviation from ideal behaviour. Draw a diagram showing the variation of vapour with mole fractions of components for a binary miscible liquid system showing negative positive deviations from Raoult's law. [Level:2] [CO3]
16. Calculate the vapour pressure of water in Nm^{-2} at 900°C given that its molecular heat of vaporization is 41 kJmol^{-1} and its normal boiling point is 100°C . ($1 \text{ atm} = 1.01325 \times 10^5 \text{ Nm}^{-2}$) [Level:3] [CO3]
17. Derive a relationship between relative lowering of vapour pressure and molecular mass of solute - Determination of molecular mass of solute. [Level:2] [CO3]
18. Explain the terms isobars and isotones with suitable examples. [Level:2] [CO4]

(Ceiling: 36 Marks)

Part C (Essay questions)

Answer any **one** question. The question carries 10 marks.

19. (a) What is meant by natural radioactivity? [Level:2] [CO4]
 (b) Discuss the distinguishing characteristics of the different types of radioactive rays.
 (c) State and explain Group Displacement Law.
20. Explain the following: [Level:2] [CO3]
 (a) Abnormal molecular mass due to association and dissociation using suitable example.
 (b) van't Hoff factor.

(1 × 10 = 10 Marks)
