

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2024**(Regular/Improvement/Supplementary)****CHEMISTRY: COMPLEMENTARY COURSE FOR PHYSICS, BOTANY & ZOOLOGY****GCHE2C02T: PHYSICAL CHEMISTRY****Time: 2 Hours****Maximum Marks: 60****SECTION A: Answer the following questions. Each carries *two* marks.****(Ceiling 20 Marks)**

1. What is meant by isotonic solutions?
2. How entropy of vaporization is related with enthalpy of vaporization?
3. Discuss the physical significance of Gibbs free energy.
4. Write down the van't Hoff osmotic pressure equation and explain the terms.
5. What happens to surface tension of liquids with increase in temperature?
6. Calculate the RMS velocity of Oxygen at STP.
7. What is a galvanic cell? Give an example.
8. Explain extensive property with an example.
9. A sample of helium gas has a volume of 540 cm³ at 100 °C. Calculate the temperature at which the volume will become 260 cm³. Assume the pressure to be constant.
10. What is compressibility factor?
11. What are Colligative properties? Discuss with an example.
12. Mention the factors that affect viscosity.

SECTION B: Answer the following questions. Each carries *five* marks.**(Ceiling 30 Marks)**

13. (a) Calculate the osmotic pressure of an aqueous solution of sucrose (C₁₂H₂₂O₁₁) that contains 0.02 kg of sucrose per dm³ at 298K.
(b) Calculate the EMF of the following cell at 298 K
Mg(s)|Mg²⁺(0.001M)||Cu²⁺(0.001M)|Cu(s)
14. State and explain Henry's law. Discuss its applications and limitations.
15. (a) If a crystal plane makes intercepts 1/2 a, 1/2 b, 1/3 c, what are the Miller indices of the plane?
(b) Calculate the change in internal energy produced when a gas expands isothermally against a constant external pressure of 1 atm, from 20 dm³ to 40 dm³, if it absorbs 650 J of thermal energy from its surroundings during the process.
16. Derive the Bragg's Equation for X-ray crystallography.
17. Explain the entropy criteria for reversible and irreversible processes.
18. Sketch the conductometric titration curve of CH₃COOH x NaOH titration and explain.
19. What are buffer solutions? Explain buffer action with an example.

SECTION C: Answer any *one* question. Each carries *ten* marks.

20. Give the Maxwells equation for the distribution of molecular velocities. Sketch the distribution curves for two different temperature and explain the influence of temperature on distribution.
21. What are fuel cells? Discuss the functioning of H₂-O₂ fuel cell with its advantages and limitations.

(1 x 10 = 10 Marks)