

D 103740

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Name.....

Reg. No.....

**SECOND SEMESTER (CBCSS—UG) DEGREE EXAMINATION
APRIL 2024**

Chemistry

CHE 2C 02—PHYSICAL CHEMISTRY

(2019—2023 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answers)*Answer questions up to 20 marks.**Each question carries 2 marks.*

1. What is the entropy change of the universe for a reversible process and irreversible process ?
2. Define closed system and isolated system.
3. Write down the van der Waal's equation and explain the terms involved.
4. Define molar conductance of an electrolyte solution. How is it related to specific conductance.
5. Explain the effect of temperature and pressure on viscosity of a liquid.
6. What are buffer solutions ? Give one example each for an acidic and basic buffer.
7. Write the electrode reactions in a Daniell cell.
8. What are fuel cells ? Write down the overall cell reaction of a H_2 - O_2 fuel cell.
9. What are anisotropic substances ? Give an example.
10. Explain reverse osmosis and mention one of its application.
11. What are real gases ? Mention the condition at which real gases obey ideal gas equation.
12. Define RMS velocity and most probable velocity.

(Ceiling of marks : 20)

Turn over

Section B (Paragraph)

Answer questions up to 30 marks.

Each question carries 5 marks.

13. Briefly explain Maxwell distribution of molecular velocities using suitable diagram.
14. What are reference electrodes ? Briefly explain the calomel electrode.
15. Write down the van't Hoff equation and explain the terms. Calculate the molar mass of a non-volatile solute if, at 25°C its solution containing 2.5 g dm⁻³ has an osmotic pressure of 1 atm. Given $R = 0.0821 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$.
16. Define vapour pressure and surface tension of a liquid. Explain the variation of these properties with temperature.
17. Write a short note on stoichiometric point defects in crystals.
18. (a) State first law of thermodynamics and give any *two* limitations of the law.
(b) Mention the condition for equilibrium and spontaneity based on ΔG value.
19. Describe buffer solutions with an example. Explain the buffer action of acetic acid/sodium acetate buffer.

(Ceiling of marks : 30)

Section C (Essay)

*Answer any **one** question.*

The question carries 10 marks.

20. a) State and explain Kohlrausch's law.
(5 marks)
b) Briefly explain conductometric titrations with reference to any two types of acid- base titrations.
(5 marks)
21. a) Write down the postulates of kinetic molecular theory of gases. Explain for the deviation of real gases from ideal behaviour.
(5 marks)
b) What are non-stoichiometric defects in crystals. Explain any *two* non-stoichiometric defects in detail.
(5 marks)

[1 × 10 = 10 marks]